

FINAL
INSTALLATION-SPECIFIC WORK PLAN
FAIRCHILD AIR FORCE BASE, WA

**Site Inspection of Aqueous Film Forming
Foam (AFFF) Release Areas Environmental
Programs Worldwide**

Contract FA8903-16-D-0027
Task Order 0004



April 2017

Prepared for:
Air Force Civil Engineer Center
JB SA Lackland, Texas

Submitted by:



FINAL

**SITE INSPECTION OF AQUEOUS FILM FORMING FOAM (AFFF) RELEASE AREAS
ENVIRONMENTAL PROGRAMS WORLDWIDE
INSTALLATION-SPECIFIC WORK PLAN**

**FAIRCHILD AIR FORCE BASE
SPOKANE, WASHINGTON**

Prepared for:

**Air Force Civil Engineer Center
Joint Base San Antonio – Lackland, Texas**



Prepared by:



Amec Foster Wheeler Environment & Infrastructure, Inc.

**Contract FA8903-16-D-0027
Task Order 0004**

April 2017

TABLE OF CONTENTS

1		
2	ACRONYMS.....	v
3	1.0 PROJECT OVERVIEW.....	1
4	1.1 PERFLUORINATED COMPOUNDS OVERVIEW.....	1
5	1.2 INSTALLATION MISSION AND HISTORY	2
6	1.3 PRELIMINARY ASSESSMENT	3
7	1.4 SITE INSPECTION OBJECTIVES AND SCOPE	3
8	2.0 REFERENCES	9
9	QAPP WORKSHEET #9: PROJECT PLANNING SESSION SUMMARY	11
10	QAPP WORKSHEET #10: CONCEPTUAL SITE MODEL.....	19
11	QAPP WORKSHEET #11: PROJECT/DATA QUALITY OBJECTIVES	21
12	QAPP WORKSHEET #13: SECONDARY DATA USES AND LIMITATIONS	25
13	QAPP WORKSHEET #14/16: PROJECT TASKS AND SCHEDULE	27
14	INSTALLATION SCOPING VISITS.....	27
15	PRE-MOBILIZATION ACTIVITIES.....	27
16	<i>Health and Safety Plan Preparation</i>	<i>27</i>
17	<i>Base Access.....</i>	<i>27</i>
18	<i>Utility Clearance</i>	<i>27</i>
19	<i>Area-Specific Regulations/Permits</i>	<i>28</i>
20	<i>Field Readiness Review.....</i>	<i>28</i>
21	MOBILIZATION/DEMOBILIZATION.....	28
22	ENVIRONMENTAL SAMPLING	28
23	<i>Soil Boring Advancement/Abandonment and Soil Sampling</i>	<i>29</i>
24	<i>Grab Groundwater Sampling from Borings.....</i>	<i>29</i>
25	<i>Monitoring Well Sampling.....</i>	<i>29</i>
26	SURVEYING.....	30
27	POTENTIAL OFF-BASE SAMPLING OF PRIVATE WELLS.....	30
28	PFAS SAMPLING CONSIDERATIONS	30
29	INVESTIGATION-DERIVED WASTE MANAGEMENT	31
30	<i>Soil IDW</i>	<i>31</i>
31	<i>Liquid IDW</i>	<i>31</i>
32	PROPOSED SITE INSPECTION SCHEDULE.....	32
33	QAPP WORKSHEET #17: SAMPLING DESIGN AND RATIONALE.....	35
34	PROPOSED SCOPE OF WORK	35
35	<i>AFFF Release Area 1: FT004 (FT01)</i>	<i>35</i>
36	<i>AFFF Release Area 2: Calibration Area</i>	<i>35</i>
37	<i>AFFF Release Area 3: Aircraft Crash Location SS008 (PS-4/9).....</i>	<i>36</i>
38	<i>AFFF Release Area 4: B52 Crash Location 1994.....</i>	<i>36</i>
39	<i>AFFF Release Area 5: Fire Station 1 (Building 3).....</i>	<i>36</i>
40	QAPP WORKSHEET #18-1: SAMPLING LOCATIONS AND METHODS	39
41	QAPP WORKSHEET #18-2: SAMPLING LOCATIONS AND METHODS	40

QAPP WORKSHEET #18-3: SAMPLING LOCATIONS AND METHODS	41
QAPP WORKSHEET #18-4: SAMPLING LOCATIONS AND METHODS	42
QAPP WORKSHEET #18-5: SAMPLING LOCATIONS AND METHODS	43
QAPP WORKSHEET #20: FIELD QC SUMMARY	45

TABLES

Table 1. Regulatory Screening Values.....	5
Table 2. List of UFP-QAPP Worksheets.	6
Table 3. Preliminary Conceptual Site Model.....	19
Table 4. Proposed Samples per Medium at Each AFFF Release Area.....	37

FIGURES

Figure 1	Site Location Map
Figure 2	Proposed AFFF Release Areas for Site Inspection
Figure 3	Proposed Sampling Locations, FT004 (FT01) and Calibration Area, AFFF Release Areas 1 and 2
Figure 4	Proposed Sampling Locations, FT004 (FT01) and Downgradient Off-Site Wells, AFFF Release Area 1
Figure 5	Proposed Sampling Locations, Aircraft Crash Location SS008 (PS-4/9) and Fire Station 1 (Building 3) AFFF Release Areas 3 and 5
Figure 6	Proposed Sampling Locations, B-52 Crash Location 1994, AFFF Release Area 4

APPENDICES

Appendix A	Installation-Specific Health and Safety Plan
------------	--

ACRONYMS

1		
2	AFB	Air Force Base
3	AFCEC	Air Force Civil Engineer Center
4	AFFF	aqueous film forming foam
5	Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
6	amsl	above mean sea level
7	API	Amec Foster Wheeler Programs, Inc.
8	ASTM	ASTM International
9		
10	bgs	below ground surface
11	BRAC	Base Realignment and Closure
12		
13	CE	Civil Engineer
14	CES	Civil Engineering Squadron
15	CFR	Code of Federal Regulations
16	CSM	conceptual site model
17	CZR	Environmental Restoration Division
18	CZT	Technical Support Division
19		
20	DO	dissolved oxygen
21	DOT	Department of Transportation
22	DPT	direct push technology
23	DQO	data quality objectives
24	DRO	diesel range organics
25		
26	Ecology	Washington Department of Ecology
27		
28	°F	degrees fahrenheit
29	FAA	Federal Aviation Administration
30	ft	feet or foot
31	FTA	fire training area
32		
33	GPS	Global Positioning System
34	GRO	gasoline range organics
35		
36	HA	Health Advisory
37	HGL	Hydrogeologic, Inc.
38	HSP	Health and Safety Plan
39		
40	IDW	investigation-derived waste
41	ISWP	Installation-Specific Work Plan
42		
43	µg/kg	micrograms per kilogram
44	µg/L	micrograms per liter
45	mg/kg	milligrams per kilogram

1	ORP	oxidation reduction potential
2	OWS	oil/water separator
3		
4	PA	Preliminary Assessment
5	PFAS	per- and polyfluorinated alkyl substances
6	PFBA	perfluorobutyric acid
7	PFBS	perfluorobutanesulfonic acid
8	PFDA	perfluorodecanoic acid
9	PFDaA	perfluorododecanoic acid
10	PFHpA	perfluoroheptanoic acid
11	PFHxA	perfluorohexanoic acid
12	PFHxS	perfluorohexane sulfonic acid
13	PFNA	perfluorononanoic acid
14	PFOA	perfluorooctanoic acid
15	PFOS	perfluorooctane sulfonate
16	PFTA or PFTeDA	perfluorotetradecanoic acid
17	PFTrDA	perfluorotridecanoic acid
18	PFUnA	perfluoroundecanoic acid
19	PPE	personal protective equipment
20	PVC	polyvinyl chloride
21		
22	QAPP	Quality Assurance Project Plan
23	QC	quality control
24	QPP	Quality Program Plan
25		
26	RPM	Remedial Project Manager
27	RSL	Regional Screening Level
28		
29	SI	Site Inspection
30	SOP	Standard Operating Procedure
31	SVOC	semivolatile organic compounds
32		
33	TOC	total organic carbon
34		
35	UFP	Uniform Federal Policy
36	USAF	United States Air Force
37	EPA	United States Environmental Protection Agency
38		
39	VOC	volatile organic compounds

1.0 PROJECT OVERVIEW

This Installation-Specific Work Plan (ISWP) was prepared under Contract No. FA8903-16-D-0027, Task Order (TO) 0004 between Amec Foster Wheeler Programs, Inc. (API) and the Air Force Civil Engineer Center (AFCEC), and is provided as an addendum to the General Quality Program Plan (QPP) (Amec Foster Wheeler Environment and Infrastructure, Inc. [Amec Foster Wheeler], 2017). This ISWP describes Site Inspection (SI) activities to be conducted at aqueous film forming foam (AFFF) areas located at Fairchild Air Force Base (AFB) to determine if a release of per- and polyfluorinated alkyl substances (PFAS) may have occurred. The AFFF areas proposed for inspection under this ISWP were identified during Preliminary Assessment (PA) research activities (CH2M HILL, 2015) and during an on-site scoping meeting as locations where PFAS may have been released to the environment.

This ISWP and the QPP have been prepared to: (1) clearly identify the SI objectives and data quality objectives (DQOs) for this project; (2) ensure that field investigations and survey protocols are documented and reviewed in a consistent manner; and (3) describe the means and methods necessary to achieve the SI objectives and DQOs and to provide data that are scientifically valid and legally defensible. Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) worksheets are provided in the following sections to accompany the General QPP. The Installation-Specific Health and Safety Plan (HSP) is provided in **Appendix A** of this ISWP.

1.1 PERFLUORINATED COMPOUNDS OVERVIEW

PFAS are a class of synthetic organofluorine compounds that possess a chemical structure that gives them unique properties, including thermal stability and the ability to repel both water and oil. These chemical properties make them useful components in a wide variety of consumer and industrial products, including non-stick cookware, food packaging, waterproof clothing, fabric stain protectors, lubricants, paints, and firefighting foams such as AFFF. AFFF concentrate contains fluorocarbon surfactants to meet required performance standards for fire extinguishing agents (Department of Defense Military Specification MIL-F-24385F [SH], Amendment 1, 5 August 1984). The United States Air Force (USAF) began purchasing and using AFFF containing PFAS (perfluorooctanesulfonic acid [PFOS] and/or perfluorooctanoic acid [PFOA]) for extinguishing petroleum fires and firefighting training activities in 1970, as confirmed by the following federal government documents:

- Military Specification for AFFF (MIL-F-24385), formally issued in 1969;
- General Accounting Office determination on sole source award protest to provide AFFF to the Navy in December 1969; and
- A History of USAF Fire Protection Training at Chanute Air Force Base, 1964-1976 (Coates, 1977).

AFFF was primarily used on USAF installations at fire training areas (FTAs), but may have also been used, stored, or released from hangar fire suppression systems, at firefighting equipment testing and maintenance areas, and during emergency response actions for fuel spills and aircraft mishaps. Although manufacturers have reformulated AFFF to eliminate PFOS, the United States Environmental Protection

Agency (USEPA) continues to permit the use of PFOS-based AFFF and the USAF maintains a significant inventory of PFOS-based AFFF. The USAF is actively replacing their current supply of AFFF with a PFOS-free formulation that may be less persistent and bioaccumulative in the environment; however, the potential exists for an incident or future contributing source of PFAS until the USAF completely replaces their inventory of PFOS-based AFFF.

The USEPA Office of Water issued lifetime drinking water Health Advisory (HA) values for PFOS and PFOA in May 2016 to protect humans from potential risk of exposure to these chemicals through drinking water; the 2016 HA values replace 2009 Provisional Health Advisory values. The HA values for PFOS and PFOA are 0.07 micrograms per liter ($\mu\text{g/L}$) for each constituent; however, when these two chemicals co-occur in a drinking water source, a conservative and health-protective approach is recommended that compares the sum of the concentrations (PFOS + PFOA) to the HA value (0.07 $\mu\text{g/L}$). HA values identify the concentration of a contaminant in drinking water at which adverse health effects are not anticipated to occur over specific exposure durations (e.g., one day, ten days, a lifetime). They serve as informal technical guidance to assist federal, state, and local officials, and managers of public or community water systems in protecting public health when emergency spills or other contamination situations occur. A HA document provides information on the environmental properties, health effects, analytical methodology, and treatment technologies for removing drinking water contaminants. HA values are not to be construed as legally enforceable federal standards and are subject to change as new information becomes available (USEPA, 2016a and 2016b).

The USEPA has not currently published Regional Screening Levels (RSLs) for PFOS or PFOA for soil or sediment; however, for this project, a screening level of 1,260 micrograms per kilogram ($\mu\text{g/kg}$) for soil and sediment was calculated using the USEPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 milligrams per kilogram (mg/kg) per day derived by USEPA in their Drinking Water Health Advisories for both PFOS and PFOA (USEPA, 2016a and 2016b). The Washington Department of Ecology (Ecology) has not issued HA values or promulgated standards for any PFAS constituents to date.

1.2 INSTALLATION MISSION AND HISTORY

Fairchild AFB is located in northeastern Washington, approximately 12 miles west of Spokane, in Spokane County, Washington, and encompasses approximately 4,300 acres (**Figure 1**). The installation is comprised of one major runway supported by numerous taxiways and support facilities, a medical clinic, housing units, and an elementary school.

The installation was established in 1942 and has served numerous missions ranging from a repair depot for damaged aircraft returning from World War II, to its current primary mission as the largest air-refueling wing in the USAF (USAF, 2016). The installation was originally constructed as a World War II repair and supply depot within the Cascade Mountains, 300 miles from the ocean, where it would be safe from Japanese attack. The installation was transferred to the Strategic Air Command in 1947 and became home of the 92nd Bombardment Wing. The 92nd Bomb Wing was re-designated the 92nd Air Refueling Wing in

1994, and the installation was transferred to the Air Mobility Command. Since then it has provided air refueling and wing supporting contingency operations around the world and today represents the backbone of the USAF west coast tanker fleet.

1.3 PRELIMINARY ASSESSMENT

HydroGeoLogic, Inc. (HGL) and subcontractor CH2M HILL (the HGL team) were contracted by AFCEC to prepare a PA of FTA and non-FTA sites at Fairchild AFB to determine locations of potential environmental release of PFAS from AFFF storage or usage areas (CH2M HILL, 2015). Sixteen potential AFFF release areas were identified during the PA research, with the following three potential AFFF release areas recommended for SI (**Figure 2**):

- 1) FT004 (FT01): The former FTA was used after 1970 through approximately 1991 during which an estimated 125 gallons or more of AFFF were used during each training exercise. After each exercise, the remaining water, fuel, and foam were drained into an oil/water separator (OWS) which discharged effluent water into a low area east of the training location.
- 2) Aircraft Crash Location SS008 (PS-4/9): An unknown quantity of AFFF was used to extinguish a JP-4 fire in March 1987 that resulted from the crash of a KC-135 aircraft in a grassy field near Buildings 2005 and 2007.
- 3) B-52 Crash Location 1994: An unknown quantity of AFFF was released onto a grassy field approximately 900 feet southeast of the control tower while extinguishing a JP-4 fire following the crash of a B-52 in 1994.

The following two additional areas are also recommended for investigation based on data obtained during the installation scoping visit conducted 27 September 2016 (see **Figure 2** and **QAPP Worksheet #9**):

- 1) Fire Station 1 (Building 3): Calibration tests using AFFF occurred on the paved area directly south of the fire engine garage. The paved area drains through a gap in the curb onto a grassy area between the pavement and a wall that divides the fire station from the airfield.
- 2) Calibration Area: AFFF was sprayed onto an old taxiway where it flowed south to an unpaved area.

1.4 SITE INSPECTION OBJECTIVES AND SCOPE

The primary objectives of this study are to:

- Determine if a confirmed release of PFOS and PFOA has occurred,
- Determine if PFOS and PFOA are present in groundwater or surface water at concentrations exceeding the USEPA lifetime HA,
- Determine if PFOS and PFOA are present in soil at concentrations exceeding calculated RSLs, and
- Identify potential receptor pathways with immediate impact to human health.

As a result of the initial SI, follow-on objectives may include the following:

- Perform follow-up sampling of off-base private drinking water wells to identify and verify where PFAS are present in drinking water at concentrations above USEPA HA values and/or state-specific standards and evaluate potential exposure pathways with immediate threats to human health.

In accordance with Interim AF Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and Base Realignment and Closure (BRAC) Installations (USAF, 2012) and USEPA lifetime drinking water HAs for PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b), a release will be considered confirmed if exceedances of the following concentrations are identified:

PFOS

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source.
- 1,260 µg/kg in soil (calculated, in the absence of RSL values).
- 1,260 µg/kg in sediment (calculated, in the absence of RSL values).

PFOA

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source.
- 1,260 µg/kg in soil (calculated, in the absence of RSL values).
- 1,260 µg/kg in sediment (calculated, in the absence of RSL values).

While PFOS and PFOA are the focus of the HA and provide specific targets for the USAF to address in the SI, USEPA has also derived RSL values for perfluorobutanesulfonic acid (PFBS) for which there is a Tier 2 toxicity value (Provisional Peer Review Toxicity Value). The USAF will also consider a release to be confirmed if exceedances of the following concentrations are identified:

PFBS

- 380 µg/L in groundwater/surface water
- 1,600,000 µg/kg in soil and sediment.

Table 1 presents screening level values for comparing the analytical results for each of the compounds.

Table 1. Regulatory Screening Values

Parameter	Chemical Abstract Number	EPA Regional Screening Level Table (May 2016) ^a			Calculated RSL for Soils and Sediments ^b (µg/kg)	USEPA Health Advisory for Drinking Water (Surface Water or Groundwater) (µg/L) ^c
		Residential Soil (µg/kg)	Industrial Soil (µg/kg)	Tap Water (µg/L)		
PFBS	375-73-5	1.6E+6	2.3E+7	380	NL	NL
PFOA	335-67-1	NL	NL	NL	1,260	0.07 ^d
PFOS	1763-23-1	NL	NL	NL	1,260	

Notes:

^a USEPA Regional Screening Levels (May 2016) [<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016>]

^b Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]

^c USEPA, May 2016a, "Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)" and USEPA, May 2016b, "Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)."

^d When both PFOA and PFOS are present, the combined concentrations of PFOA and PFOS should be compared with the 0.07 µg/L HA level.

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

USEPA = Environmental Protection Agency

NL = not listed

RSL = risk-based screening level

Follow-on objectives and sampling design and rationale, if applicable, will be defined and described in addendums to this ISWP. It is anticipated that follow-up sampling of known off-base private drinking water wells located east of the base may be needed to identify and verify whether PFAS are present in drinking water at concentrations above USEPA HA values. However, any follow-up off-base sampling will only be conducted in the event PFAS are detected above the USEPA HA values at the eastern base boundary (at FT004 [FT01]). If PFAS are not detected and/or detected at concentrations less than the USEPA HA values, stakeholders will review the sample results and evaluate the need for collection of additional data to confirm the results and the need to sample off-base private wells.

The proposed sampling approach for Fairchild AFB is detailed in QAPP Worksheets #9, #10, #11, #13, #14/16, #17, #18, and #20 of this ISWP. The QAPP consists of 37 prescriptive worksheets to document aspects of the environmental investigation process of the SI and to guide the fieldwork. Table 2 presents the required elements of the QAPP, the worksheets where these elements can be found, and the document containing the worksheet.

1

Table 2. List of UFP-QAPP Worksheets.

Required Element	UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QPP	Presented in ISWP
Title and Approval Page	1 and 2	Identifies the principal points of contact for all organizations having decision-making authority in the project and documents their commitment to implement the QAPP.	X	
Project Organization and QAPP Distribution	3 and 5	Identifies key project personnel, lines of authority, and lines of communication among the lead agency, prime contractor, subcontractors, and regulatory agencies.	X	
Personnel Qualifications and Sign-Off Sheet	4, 7, and 8	Identifies key project personnel for each organization performing tasks defined in the QAPP and documents their commitment to implementing the QAPP.	X	
Communication Pathways and Procedures	6	Documents specific issues (communication drivers) that will trigger the need to communicate with other project personnel or stakeholders.	X	
Project Planning Session Summary	9	Provides a record of the notes taken during the site scoping visit.		X
Conceptual Site Model (CSM)	10	Presents the installation-wide CSM with information on each AFFF release area.		X
Project/Data Quality Objectives (DQOs)	11	Documents the DQOs, the environmental decisions that need to be made, and the level of data quality needed to ensure that those decisions are based on sound scientific data using USEPA's seven-step data quality objective process.	X	X
Measurement Performance Criteria	12	Documents the quantitative measurement performance criteria in terms of precision, bias, and sensitivity for field and laboratory measurements and is used to guide the selection of appropriate measurement techniques and analytical methods.	X	
Secondary Data Uses and Limitations	13	Identifies sources of secondary data and summarizes information relevant to their uses for the current project.		X
Project Tasks and Schedule	14 and 16	Presents the proposed installation-specific schedule for the SI activities, specific tasks, group responsible for their execution, and planned start and end dates.		X
Project Action Limits and Laboratory- Specific Detection/ Quantitation Limits	15	This worksheet is completed for each matrix, analyte, and analytical method. The purpose is to make sure the selected analytical laboratory and method can provide accurate data at the project action limit.	X	
Sampling Design and Rationale	17	Describes the sampling design and the basis for selection of each AFFF release area for SI.		X

Required Element	UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QPP	Presented in ISWP
Sampling Locations and Methods	18	Provides a completeness check for field personnel and auditors for all samples anticipated for collection during the SI. It will facilitate checks to ensure all planned samples have been collected and appropriate methods have been used. The worksheet lists each individual sample that is planned to be collected, including field quality control (QC) samples.		X
Sample Containers, Preservation, and Hold Times	19 and 30	Worksheets serve as a reference guide for field personnel. They are also an aid to completing the chain of custody forms and shipping documents.	X	
Field Quality Control	20	Provides a summary of the types of samples to be collected and analyzed for the project to show the relationship between the number of field samples and associated QC samples.		X
Field Standard Operating Procedures (SOPs)	21	Documents the specific field procedures being implemented. The QPP contains detailed descriptions of procedures for all field activities, including sample collection; sample preservation; equipment cleaning and decontamination; equipment testing, maintenance, and inspection; and sample handling and custody.	X	
Field Equipment Calibration, Maintenance, Testing	22	Documents procedures for calibrating, maintaining, testing, and/or inspecting all field equipment.	X	
Analytical SOPs	23	Documents information about the specific sample preparation and analytical procedures to be used.	X	
Analytical Instrument Calibration	24	Documents the laboratory calibration procedures and is completed for all analytical instruments referencing the project laboratory quality manual.	X	
Analytical Instrument and Equipment Maintenance, Testing, and Inspection	25	Documents the procedures for maintaining, testing, and inspecting laboratory analytical equipment and was completed referencing the project laboratory quality manual.	X	
Sample Handling, Custody, and Disposal	26 and 27	Documents responsibilities for maintaining custody of samples from sample collection through disposal.	X	
Analytical Quality Control and Corrective Action	28	Ensures that the selected analytical methods are capable of meeting the project-specific measurement performance criteria.	X	

Required Element	UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QPP	Presented in ISWP
Project Documents and Records	29	Records information for all documents and records that will be generated for the project. It describes how information will be collected, verified, and stored. The purpose is to support data completeness, data integrity, and ease of retrieval.	X	
Assessments and Corrective Action	31, 32, and 33	Documents responsibilities for conducting project assessments, responding to assessment findings, and implementing corrective action.	X	
Data Verification and Validation Inputs	34	Lists the inputs that will be used during data verification and validation.	X	
Data Verification Procedures	35	Documents procedures that will be used to verify project data.	X	
Data Validation Procedures	36	Documents procedures that will be used to validate project data.	X	
Data Usability Assessment	37	Documents procedures that will be used to perform the data usability assessment.	X	

Notes:

- AFFF = aqueous film forming foam
- CSM = Conceptual Site Model
- DQOs = data quality objectives
- ISWP = Installation-Specific Work Plan
- QAPP = Quality Assurance Project Plan
- QC = quality control
- SI = Site Inspection
- SOP = Standard Operating Procedure
- UFP = Uniform Federal Policy
- USEPA = United States Environmental Protection Agency

2.0 REFERENCES

- 1
- 2 Amec Foster Wheeler, 2016. *Working Copy (Revision 1) Site Inspection of Film Forming Foam (AFFF)*
- 3 *Release Areas Quality Program Plan*. November.
- 4 Coates, C.Y. 1977. *A History of USAF Fire Protection Training at Chanute Air Force Base, 1964-1976*.
- 5 Chanute Technical Training Center, Chanute AFB, Illinois. February.
- 6 CH2M HILL, 2009, *Final Work Plan for Triad-Based Contaminant Source Reduction at the Craig Road*
- 7 *Landfill- Fairchild AFB, Washington*. May.
- 8 CH2M HILL, 2015, *Final Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force*
- 9 *Base, Spokane, Washington*. June.
- 10 United States Air Force (USAF), 2016. *Fairchild Air Force Base: A Brief History* at
- 11 [http://www.fairchild.af.mil/About-Us/Fact-Sheets/Display/Article/238991/fairchild-air-force-base-a-](http://www.fairchild.af.mil/About-Us/Fact-Sheets/Display/Article/238991/fairchild-air-force-base-a-brief-history)
- 12 [brief-history](http://www.fairchild.af.mil/About-Us/Fact-Sheets/Display/Article/238991/fairchild-air-force-base-a-brief-history), published 15 March.
- 13 United States Environmental Protection Agency (USEPA), 2012. *Uniform Federal Policy for Quality*
- 14 *Assurance Project Plans Workbook*. March.
- 15 USEPA, 2016a. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)*. May.
- 16 USEPA, 2016b. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)*. May.

QAPP WORKSHEET #9: PROJECT PLANNING SESSION SUMMARY

Four planning sessions were conducted during development of the ISWP. The sessions included:

- **Planning session 1:** Installation Scoping Visit, conducted 27 September 2016
- **Planning session 2:** SI Scoping Call with AFCEC and USEPA, conducted 14 November 2016
- **Planning session 3:** Stakeholder conference call with AFCEC and USEPA, conducted 17 January 2017
- **Planning session 4:** Stakeholder conference call with AFCEC and USEPA, conducted 23 January 2017

Planning Session 1, Installation Scoping Visit: Fairchild AFB, Spokane, Washington

Purpose: The purpose of the Installation Scoping Visit was to (1) inspect potential AFFF release areas identified in the PA (CH2M HILL, 2015) to confirm if sampling is warranted during the Task Order 0004 investigation, (2) understand site logistics so that they could be incorporated into this ISWP, and (3) understand existing conditions so that they could be used to develop the investigation strategy and be factored into this ISWP and subcontractor scopes of work. The results of the Installation Scoping Visit were used to develop the sampling plan as detailed in **QAPP Worksheets #17 and #18**.

Attendees:

- Marc Connally, Remedial Project Manager (RPM), AFCEC/CZOM
 - Ed Zuelke, Restoration Program Manager, AFCEC/CZOM
 - Kurt Lee (by teleconference), Remedial Program Manager, AFCEC/CZRW
 - Bethany Flynn, Amec Foster Wheeler, Regional Lead
 - Teresa Wilson, Amec Foster Wheeler, Field Team
 - Kurt Lee, AFCEC CZR
 - Monique Nixon, AFCEC/CZT
 - Joel Espinoza, 92 Civil Engineering Squadron (CES)-Fairchild
 - Paul DeRocker, 92 CES
 - Michael Huggins, 92 AMDS
 - Lauren Stingley, 92 CES
 - Bill Shelton, 92 CES/CEIE
 - Roberta LaPorte, 92 OSS/OSAA
 - SSgt Ian Drain, 92 AMDS/SGPB
 - Capt Marco Specoli, 92 ARW/JA
-

1 **27 September 2016:** Amec Foster Wheeler personnel (Ms. Bethany Flynn and Ms. Teresa Wilson) arrived
2 at Fairchild AFB and obtained one-day visitor passes. Ms. Flynn and Ms. Wilson met with Mr. Marc
3 Connally, RPM, and Mr. Ed Zuelke, Environmental Restoration Program Manager, in a conference room
4 with other attendees. The attendee list included personnel knowledgeable about AFFF storage or releases,
5 as well as base logistics leads who could provide information on investigation logistics such as waste
6 storage and airfield restrictions.

7 Logistical details of the upcoming investigation work were discussed. Base access forms for Amec Foster
8 Wheeler and all on-site subcontract personnel will be submitted to Mr. Marc Connally approximately 30
9 days prior to the field date. No daily briefings with USAF personnel will be required. Work will not be
10 conducted on weekends or holidays. For the proposed locations, including FT004 (FT01), no escort is
11 needed and no other administrative requirements (e.g., airfield waiver) are applicable; an Amec Foster
12 Wheeler lock will be used to access areas within the airfield perimeter.

13 Dig permits will be required for each location. Amec Foster Wheeler will stake locations a minimum of
14 one month in advance of field work and will provide location information to Mr. Connally for dig permit
15 approval. The dig permits will be kept on site during field work. No natural resources restrictions were
16 identified that would restrict the scheduling or performance of the proposed field work. USAF personnel
17 will take photographs when working within the airfield; however, no photographic restrictions apply to
18 other investigation areas. Traffic plans are not required. Permanent monitoring wells will be installed
19 using flush-mounted completions within the installation where appropriate.

20 The USAF will provide information on contamination in the proposed investigation areas for consideration
21 in preparation of a site-specific HSP. Investigation-derived waste (IDW) will be staged in Building 2411
22 pending characterization, profiling, and off-site disposal.

23 Weather was discussed as a factor in scheduling field work. Mr. Lee suggested that if field work does not
24 occur before mid-November, delaying drilling work until March is acceptable to avoid heavy snow and
25 frozen ground, which can inhibit subsurface utility line location and drilling operations.

26 No other releases or potential AFFF sources were identified by the meeting attendees, with the exception
27 of potential releases to the sanitary sewer. Mr. Lee suggested the SI focus on documented releases and
28 migration via known conceptual site model (CSM) elements. Mr. Zuelke agreed to check with the on-base
29 fire department to confirm practices that may have led to releases to the sanitary or storm sewer systems.
30 Mr. Zuelke also agreed to provide detailed locations from base records of the two crash sites that are part
31 of the SI scope of work.

32 Amec Foster Wheeler and AFCEC personnel visited the following AFFF release areas to determine
33 potential sampling locations and any utility/site conflicts with said locations:

34 **FT004 (FT01):** AFFF was reportedly used in this former unlined fire training burn pit from the early 1960s
35 through 1991. Excess AFFF, water, and fuel remaining after each training exercise were discharged to an
36 OWS, which in turn discharged effluent water to an open area east of the burn pit. Previous soil excavation

1 was completed in this area. The former burn pit was located on a slightly elevated area, approximately 2
2 feet above the adjacent grade to the east and south. Several existing groundwater monitoring wells and
3 wells related to an air sparge treatment system were observed southeast and east of the elevated area
4 along the migration pathway of groundwater petroleum contamination. Monitoring well locations are
5 accessible, and survey coordinates will be used to identify the locations of the former burn pit and soil
6 excavation. Two soil borings will be located within and adjacent to the former burn pit, and existing
7 monitoring wells located near the source area and to the east near the base perimeter will be sampled.

8 **Calibration Area:** This site was not recommended for further investigation in the PA Report; however,
9 based on a discussion with R. Woodworth, Assistant Fire Chief for Fairchild AFB, AFFF was periodically
10 sprayed onto the roadway just south of the current FTA for equipment calibration. AFFF subsequently
11 flowed off the roadway to the south onto unpaved areas. This site was not directly observed during the
12 scoping visit; however, the SI scope has been developed to include two soil borings and one grab
13 groundwater sample from locations immediately south of the roadway.

14 **Fire Station 1 (Building 3):** This site was not recommended for further investigation in the PA Report;
15 however, based on a discussion with R. Woodworth, AFFF was sprayed onto the paved driveway area
16 directly south of the fire engine garage for equipment calibration. The paved area drains through a gap in
17 the curb into a grassy area between the pavement and a wall that divides the fire station from the airfield.
18 Standing water was observed in an approximate 2- by 3-foot area immediately adjacent to the curb gap
19 off the pavement. Anecdotally, AFFF has been released during calibration testing, and foaming occurred
20 in the grassy area. The foam likely infiltrated in the grassy area and/or entered the storm drain system via
21 a catch basin in the grassy area. The storm drain system discharges to a retention pond at the east side of
22 the base. Two soil borings will be advanced and sampled within the grassy area. One groundwater sample
23 will be collected from the soil boring nearest the curb gap, and one groundwater sample will be collected
24 from existing downgradient monitoring well MW-399. During subsequent discussions with the Air Force
25 and USEPA in January it was determined that collection of a sediment sample from the retention pond
26 was not necessary during the SI.

27 **Aircraft Crash Location SS008 (PS-4/9):** Based on detailed crash site information provided by Mr. Zuelke
28 after the scoping visit, the 1987 crash occurred in what are now grassy and parking lot areas near Buildings
29 2005 and 2007. Mr. Connally noted that several of the groundwater monitoring wells that appear on base
30 drawings do not exist or are not locatable. As the exact location of AFFF application is unknown, three
31 borings will be advanced and soil will be sampled along the axis of the crash area, and groundwater
32 samples will be collected from three existing shallow groundwater monitoring wells located within and
33 downgradient of the crash site (MW-438, MW-265, and MMW-1023-1).

34 **B-52 Crash Location 1994:** The B-52 crash location was confirmed during the scoping visit to be in the
35 southern portion of the area shown in the PA Report. Based on detailed crash site information provided
36 by Mr. Zuelke after the scoping visit, the crash occurred within and south of the southern boundary shown
37 in the PA Report, near an electrical substation compound. The crash area was reportedly limited due to

the angle of the aircraft approach. Subsurface electrical lines run north/south through the crash site area and will need to be accurately located and clearly marked prior to investigation. An open drainage swale is located in the northeastern portion of the crash area. As the exact location of AFFF application is not known, three borings will be advanced and soil will be sampled along the axis of the crash area, and grab groundwater samples will be collected from each boring. (In response to EPA comments, this was later changed to include grab samples from two of the three borings, and sampling of a downgradient existing monitoring well, MW-451.)

Planning Session 2, SI Scoping Call: Teleconference with AFCEC and USEPA, conducted 14 November 2016

Purpose: The purpose of the teleconference was to present the proposed investigation approach for each of the identified investigation areas and receive input from the USEPA on the approach. The results of the SI Scoping Call were used to further develop the sampling plan as detailed in **QAPP Worksheets #17** and **#18**.

Attendees:

- Marc Connally, RPM, AFCEC/CZOM
- Ed Zuelke, Restoration Program Manager, AFCEC/CZOM
- Kurt Lee, Remedial Program Manager, AFCEC/CZRW
- Bethany Flynn, Amec Foster Wheeler, Regional Lead
- Teresa Wilson, Amec Foster Wheeler, Field Team
- Monique Nixon, AFCEC/CZT
- Kim Prestbo, USEPA
- John Burchette, USEPA

A pre-work-plan scoping teleconference was conducted among AFCEC, USEPA, and Amec Foster Wheeler to review the proposed scope of the SI for the AFFF Areas identified for further investigation as part of the PA and during the 27 September 2016 Installation Scoping Visit.

Prior to the call, figures showing proposed sample locations and drafts of **QAPP Worksheets #10** and **#17** were provided to the attendees for review. Following discussions, it was decided that groundwater sampling at FT004 (FT01) would be completed as a separate phase in winter 2017. The results of the sampling would be used to determine presence or absence of PFOS, PFOA, or combined PFOS and PFOA above the HA at FT004 (FT01), including base boundary wells. If PFOS, PFOA, or the combined total of PFOS and PFOA exceed the HA, private drinking water wells located downgradient of FT004 (FT01) would be sampled. The scope of work planned for the remaining AFFF areas was also discussed. A few

modifications to the proposed approach were identified and used to further develop the sampling approach as detailed in **QAPP Worksheets #17** and **#18**.

Planning Session 3, Stakeholder Conference Call: Teleconference with AFCEC and USEPA, conducted 17 January 2017

Purpose: The purpose of the teleconference was to further refine the groundwater sampling approach at FT004 (FT01) and define the scope of off-base private well sampling if PFOS or PFOA is present above their respective HAs in samples collected in monitoring wells at FT004 (FT01).

Attendees:

- Marc Connally, RPM, AFCEC/CZOM
 - Ed Zuelke, Restoration Program Manager, AFCEC/CZOM
 - Kurt Lee, Remedial Program Manager, AFCEC/CZRW
 - Bethany Flynn, Amec Foster Wheeler, Regional Lead
 - Teresa Wilson, Amec Foster Wheeler, Field Team
 - Monique Nixon, AFCEC/CZT
 - Kim Prestbo, Project Manager, USEPA
 - Carolyn Acheson, Chemist, USEPA
 - Ted Repasky, Hydrogeologist, USEPA
-

Prior to the call, figures showing proposed sample locations and **QAPP Worksheets #10** and **# 17** were provided to the attendees for reference. Items discussed during the meeting included:

- Laboratory methods proposed for analysis of soil and groundwater samples
- Consideration of PFOA and PFOS precursor compounds (e.g., 8:2 fluorotelomer sulfonate [FTS] transformation to PFOA)
- Locations and number of wells selected for sampling at FT004 (FT01)
- Locations and number of private off-site water wells selected for sampling if there is an HA exceedance in the FT004 (FT01) sampling results
- Rationale for determining the need for any expanded scope of work at identified AFFF sites

The following actions were identified during the meeting:

- The USAF will provide additional information to the USEPA on the laboratory SOPs and laboratory comparability data from previous USAF PFAS sampling programs. A separate call will be scheduled if needed.

- Existing wells MW-3, MW-225, MW-226, MW-50, and MW-100 were selected for sampling at FT004 (FT01). If PFOS or PFOA exceed the HA in samples collected from any boundary well, off-base private water well sampling will be triggered. If PFOS and PFOA are not detected above the HA, the Stakeholders will meet to discuss the need for further actions.
- The USAF will provide a figure showing the area proposed for any off-base private well sampling.
- An additional teleconference was scheduled for 23 January 2017 to finalize the sampling rationale and review the scope of work for other AFFF areas.
- The USAF will continue discussions with its Public Affairs office regarding an outreach plan, to avoid potential delays in contacting private well owners in the event that FT004 (FT01) sampling results indicate the need for off-base sampling.

Planning Session 4, Stakeholder Conference Call: Teleconference with AFCEC and USEPA, conducted 23 January 2017

Purpose: The purpose of the teleconference was to further refine the groundwater sampling approach at FT004 (FT01) and define the scope of off-base private well sampling if PFOS or PFOA are present above their respective HAs in samples collected in monitoring wells at FT004 (FT01).

Attendees:

- Marc Connally, RPM, AFCEC/CZOM
- Kurt Lee, Remedial Program Manager, AFCEC/CZRW
- Bethany Flynn, Amec Foster Wheeler, Regional Lead
- Teresa Wilson, Amec Foster Wheeler, Field Team
- Joe Fassio, Amec Foster Wheeler, Field team
- Monique Nixon, AFCEC/CZT
- Kim Presbo, Project Manager
- Carolyn Acheson, Chemist, USEPA
- Ted Repasky, Hydrogeologist, USEPA
- Abigail Power, Ageiss
- Brian Panther, Ageiss

Prior to the call, updated figures showing proposed sample locations and draft text outlining the decision criteria for sampling off-base private wells were provided to the attendees for reference. Items discussed during the meeting included:

- Final locations and the number of wells selected for sampling at FT004 (FT01)

- Final locations and number of private off-site water wells selected for sampling if an HA is exceeded during FT004 (FT01) sampling
- Final boring locations and wells to sample at the remaining AFFF sites
- Final rationale for determining the need for expanded scope of work at AFFF sites

The following actions were identified during the meeting:

- Existing shallow groundwater monitoring wells MW-3, MW-225, MW-226, MW-50, and MW-100 were selected for sampling at FT004 (FT01). MW-3 was confirmed to be a source area well, while the others are boundary wells. If PFOS or PFOA exceed the HA in samples collected from any boundary well, off-base private water well sampling will be triggered. If PFOS and PFOA are not detected above the HA, or if they are detected above the HA only at MW-3, the Stakeholders will meet to discuss the need for further actions. The approach was finalized during the meeting. Sampling was scheduled for week of 13 February 2017.
- The area downgradient of FT004 where private water well sampling will be initiated if necessary was finalized. The USAF is working to verify wells and locations for sampling, and to match addresses to wells. The USAF continues to work on the public outreach plan.
- The rationale for soil and groundwater sampling at the other four AFFF areas identified for sampling was reviewed and the results of discussions are incorporated in **QAPP Worksheets #17 and #18**.

QAPP WORKSHEET #10: CONCEPTUAL SITE MODEL

An installation-wide Preliminary CSM with information regarding AFFF release areas is presented below. The preliminary CSM will be revised based upon the information and data collected during the site inspections, additional research, well surveys, and follow-on inspections, and presented as a narrative in the SI Report.

Table 3. Preliminary Conceptual Site Model.

Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
<p>Installation Description/History:</p> <ul style="list-style-type: none">Years of operation: 1942 to present.Size: Approximately 4,300 acres.Location: Approximately 12 miles southwest of Spokane, Washington.Layout: Comprised of one major runway supported by numerous taxiways and support facilities, a medical clinic, housing units, and an elementary school.History: Constructed as a WWII repair and supply depot within the Cascade Mountains 300 miles from the ocean where it would be safe from Japanese attack. In 1947 the installation was transferred to the Strategic Air Command and became home of the 92nd Bombardment Wing where it operated until 1994 when the 92nd Bomb Wing was re-designated the 92nd Air Refueling Wing and the base was transferred to the Air Mobility Command. Since then it provides air refueling and wing supporting contingency operations around the world and today represents the backbone of the Air Force’s west coast tanker fleet.Mission: “Provide responsive, precise air refueling and operational support for the full range of military operations.” <p>AFFF Use:</p> <p>AFFF containing PFAS was used for firefighting training activities, testing of firefighting equipment, and extinguishing petroleum fires.</p> <p>Sixteen potential AFFF release areas were identified during the PA research by CH2M HILL. Through research and interviews with knowledgeable Base personnel, 13 of these potential release areas were determined to be unlikely to have caused a release of AFFF to the environment. The following three potential AFFF release areas were recommended for SI (Figure 2):</p> <ul style="list-style-type: none">Site FT004 (FT01)Aircraft Crash Location SS008 (PS-4/9)B-52 Crash Location 1994	<p>Topography:</p> <ul style="list-style-type: none">Fairchild AFB is within the Columbia Plateau. The ground surface is relatively flat and slopes towards the northeast. Elevations range from 2,400 to 2,460 feet (ft) above mean sea level (amsl). <p>Surface Water:</p> <ul style="list-style-type: none">“No Name” Creek is the primary pathway for surface runoff at Fairchild AFB. It flows approximately one mile from a stormwater retention pond located south of the runway on the east side of the base, and does not enter another surface water body before flow infiltrates or evaporates. “No Name” Creek is the sole surface water discharge point from the base.Stormwater collected within stormwater drains throughout the base empty into the retention pond.Other surface water runoff not collected by the drains flows to swales that run along the inside of the perimeter fence where the water either infiltrates into the ground or evaporates. <p>Soils:</p> <ul style="list-style-type: none">Alluvial deposits at Fairchild AFB consist of layers of sands and gravels with some silt and clay. These were Quaternary flood deposits from former glacial Lake Missoula of Pleistocene age. <p>Geology:</p> <ul style="list-style-type: none">Surficial sediments consist of up to 50 feet of alluvial sediments composed mostly of sand and gravel with some silt deposits.Underlying the alluvial deposit is a thick sequence of layered basalt associated with the regional Columbia River Basalt Group.The uppermost sequence of basalts is referred to as Basalt A and Basalt B. Basalt A varies in thickness from approximately 160 to 190 ft.Basalts A and B are separated by a low permeability clay referred to as Interbed A.The basalt flows are underlain by massive granitic rock. <p>Hydrogeology:</p> <ul style="list-style-type: none">Groundwater at Fairchild AFB is typically encountered at 3 to 12 ft below ground surface (bgs) in alluvium or within the fractured and weathered upper portion of Basalt A under unconfined conditions.	<p>Contaminants of Potential Concern:</p> <ul style="list-style-type: none">Contaminants of Potential Concern are PFAS, which are compounds that are used in formulation of AFFF.Fuel-related compounds and chlorinated solvents are historical site contaminants. <p>Media of Potential Concern:</p> <ul style="list-style-type: none">Soil, groundwater, and sediment. <p>Confirmed or Potential AFFF Release Areas</p> <ul style="list-style-type: none">FT004 (FT01) – AFFF used from 1970-1991. Approximately 125 gallons of AFFF were used during each training exercise. Water was drained into an oil-water separator that discharged into a low area east of the training location.Calibration Area – AFFF was sprayed onto old taxiway pavement where it could runoff onto unpaved area.Aircraft Crash Location SS008 (PS-4/9) – KC-135 crashed in grassy area in March 1987. An unknown amount of AFFF was used to extinguish the fire. AFFF likely infiltrated into the ground.B-52 Crash Location 1994 – B-52 crashed in grassy field approximately 900 ft. southeast of the tower. Unknown amount of AFFF was used to extinguish the fire.Fire Station 1 (Building 3) - According to Assistant Fire Chief, calibration tests have occurred on the paved area directly south of the fire engine garage. The paved area drains through a gap in the curb into a grassy area between the pavement and a wall that divides the fire station from the airstrip.	<p>Potential Receptors:</p> <ul style="list-style-type: none">No Name Creek.Stormwater retention pond on the east side of the base south of the runway.Humans/non-residential, maintenance workers, groundskeepers.Biota – Endangered species at or in the vicinity of the sites.Off-site residences on private wells.	<p>Potential Ecological Receptors:</p> <ul style="list-style-type: none">Inland and aquatic plant species, reptiles, birds, soil invertebrates, and mammals that inhabit or migrate through the installation or are in the vicinity of No Name Creek. <p>Threatened and Endangered Species:</p> <p>Threatened species that are known to inhabit Spokane County and may possibly be found within the boundary of Fairchild AFB include the following:</p> <ul style="list-style-type: none">Bald Eagle (<i>Haliaeetus leucocephalus</i>).Bull Trout (<i>Salvelinus confluentus</i>).Spaldings Catchfly (<i>Silene spaldingii</i>).Water Howellia (<i>Howellia aquatilis</i>).

Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
<p>The following two potential AFFF release areas were added to the SI based on information from the Installation Scoping Visit:</p> <ul style="list-style-type: none">Fire Station 1 (Building 3)Current FTA/Calibration Area	<ul style="list-style-type: none">Groundwater within both the alluvium and Basalt A generally flows west to east across Fairchild AFB except for the very western margin of the base, where a groundwater flow divide directs groundwater flow toward the west.At the eastern side of the base groundwater flow splits around a basalt outcrop resulting in flow towards the northeast and southeast <p>Meteorology:</p> <ul style="list-style-type: none">The average annual rainfall is 16.6 inches/year.The average temperature is 49.4 degrees Fahrenheit (°F).The average annual snowfall is 44.9 inches, occurring primarily in the winter months.	<p>Primary Release Pathways:</p> <ul style="list-style-type: none">Release or application of AFFF to the ground at potential source areas.Infiltration of PFAS deeper into the soil column over time potentially reaching groundwater.AFFF washed into drainage, stormwater, or sewer system. <p>Potential Migration Pathways:</p> <ul style="list-style-type: none">Infiltration into groundwater (unconsolidated material, fracture flow, etc.)Direct discharge into stormwater collection systemAdsorption to soil matrix near sourceTopographic controlled migrationMigration with groundwater flow		

1 Sources:
2 CH2M HILL, 2015, Final Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force Base, Spokane, Washington. June.
3 Fairchild Air Force Base: A Brief History, March 15, 2016, <http://www.fairchild.af.mil/About-Us/Fact-Sheets/Display/Article/238991/fairchild-air-force-base-a-brief-history>
4 Scoping Visit, September 27, 2016.
5 Weather DB, Fairchild AFB, site visited December 16, 2016, <https://www.weatherdb.com/>

QAPP WORKSHEET #11: PROJECT/DATA QUALITY OBJECTIVES

The following presents site-specific DQOs for the proposed investigation at Fairchild AFB. These DQOs were developed using USEPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* USEPA QA/G-4 (USEPA, 2006).

Step 1: State the Problem

AFFF containing PFAS was stored, used, and/or released at Fairchild AFB during firefighting testing and training activities, suppression of petroleum fires, and in hangar fire suppression systems.

Step 2: Identify the Goals of the Study

The objectives of this study are to:

- Conduct an initial SI at AFFF release areas selected for inspection to determine if a confirmed release of PFOS and PFOA has occurred;
- Determine if PFOS and PFOA are present in groundwater or surface water at concentrations exceeding the USEPA lifetime HA;
- Determine if PFOS and PFOA are present in soil at concentrations exceeding calculated RSLs; and
- Identify potential receptor pathways with immediate impact to human health.

As a result of the initial SI, follow-on objectives may include the following:

- Perform follow-up sampling of off-base private drinking water wells to identify and verify where PFAS are present in drinking water at concentrations above USEPA HA values and/or state-specific standards and evaluate potential exposure pathways with immediate threats to human health. If PFAS are not detected and/or detected at concentrations less than the USEPA HA values, stakeholders will review the sample results and evaluate the need for collection of additional data to confirm the results and the need to sample off-base private wells.

Step 3: Identify Information Input

The following data and information are required to achieve the project goals:

- Collection and laboratory analysis of soil samples from soil borings advanced at areas where AFFF was released at Fairchild AFB; and
- Collection and laboratory analysis of groundwater samples from areas where AFFF was released at Fairchild AFB.

Follow-on objectives and informational inputs, as applicable, will be provided in addenda to this ISWP as needed.

Step 4: Define the Boundaries of Data Collection

The investigation boundaries are depicted on the attached area-specific figures that illustrate the features and proposed sampling locations at each of the five AFFF release areas at Fairchild AFB. The investigation is defined vertically by the depth of groundwater.

Step 5: Develop the Analytical Approach

Analytical data will include the analysis of the following 16 PFAS by Modified USEPA Method 537 using liquid chromatography-tandem mass spectrometry (LC-MS/MS):

- PFOS;
- PFOA;
- PFBS;
- Perfluoroheptanoic acid (PFHpA);
- Perfluorohexane sulfonic acid (PFHxS);
- Perfluorononanoic acid (PFNA);
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA);
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA);
- Perfluorodecanoic acid (PFDA);
- Perfluorotetradecanoic acid (PFTA);
- Perfluorododecanoic acid (PFDoA);
- Perfluorohexanoic acid (PFHxA);
- Perfluorotridecanoic acid (PFTrDA);
- Perfluoroundecanoic acid (PFUnA);
- 6:2 Fluorotelomer sulfonate (6:2 FTS); and
- 8:2 FTS.

One soil sample per boring will also be collected and submitted for analysis of physiochemical properties, including soil pH (USEPA Method 9045B), particle size analysis (American Society for Testing and Materials [ASTM] D422), and total organic carbon (TOC) content (USEPA 9060 or Lloyd Kahn Method).

Release Determination

In accordance with Interim AF Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations (USAF, 2012) and USEPA HA values for PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b), a release will be considered confirmed if exceedances of the following concentrations are identified:

PFOS

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source.

- 1,260 µg/kg in soil (calculated, in the absence of regional screening-level values).
- 1,260 µg/kg in sediment (calculated, in the absence of regional screening-level values).

PFOA

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source.
- 1,260 µg/kg in soil (calculated, in the absence of regional screening-level values).
- 1,260 µg/kg in sediment (calculated, in the absence of regional screening-level values).

PFOS + PFOA

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source.

While PFOS and PFOA are the focus of the HA and provide specific targets for the USAF to address in the SI, USEPA has also derived RSL values for PFBS for which there is a Tier 2 toxicity value (Provisional Peer Review Toxicity Value). The USAF will also consider a release to be confirmed if exceedances of the following concentrations are identified:

PFBS

- 380 µg/L in groundwater/surface water.
- 1,600,000 µg/kg in soil and sediment.

If PFAS are detected in sampled media at concentrations exceeding USEPA HA values, RSLs, and/or concentrations established by state regulations, then the AFFF area will require follow-on investigation or step-out sampling. In the absence of local standards and in accordance with the Interim Air Force Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations dated 27 Aug 2012 (USAF, 2012), further evaluation will be performed if the following HA levels are exceeded in groundwater samples collected as part of this SI program:

- PFOS: 0.07 µg/L
- PFOA: 0.07 µg/L
- PFOS + PFOA: 0.07 µg/L

Further Evaluation: If PFAS concentrations from the follow-on sampling exceed USEPA HA values, RSLs, and/or concentrations established by state regulations, then the USAF will be informed of the results to evaluate the need to conduct further investigation to delineate PFAS concentrations, identify potential migration pathways, and identify downstream and/or downgradient receptors. Follow-on investigation and step-out sampling will be conducted to evaluate the extent of PFAS concentrations, delineate downgradient groundwater plumes (as applicable), further define the environmental setting, and identify AFFF areas with potential impacts to down-stream and/or downgradient receptors.

Drinking Water Source Assessment: If PFAS are identified at concentrations exceeding USEPA HA values and/or concentrations established by state regulations in downgradient installation boundary monitoring

wells, and a potential migration pathway is identified to downgradient drinking water supplies, then public/drinking water wells will be sampled.

Protect Human Health: If PFAS are identified at concentrations exceeding USEPA HA values and/or state-specific standards in private drinking water wells, then the USAF will be contacted to evaluate the mitigation measures that may be necessary. Mitigation measures will be applied to private drinking water wells that present an imminent threat to human health from PFAS related to USAF activities at the installation.

Step 6: Specify Performance or Acceptance Criteria

- Daily standardized PFAS personal protective equipment (PPE)/equipment checklist (provided in the PFAS protocol standard operating procedure [SOP]) will be completed by the field manager. The quality assurance (QA) manager will review and accept the final checklist.
- QA manager or designee will verify field procedures defined in the QPP and ISWP are properly followed through field audits. Any deviations will be promptly communicated, addressed, and documented.
- Analytical laboratories will carry current accreditation.
- USEPA Stage 2B data verification will be conducted on 100 percent of the data and USEPA Stage IV data validation will be conducted on 10 percent of the PFAS analytical data by an experienced chemist to assess the data usability.

Step 7: Develop the Detailed Plan for Obtaining Data

The detailed plan for obtaining the data is presented in the following **QAPP Worksheets: #13, #14/16, #17, #18, and #20**. SOPs for collecting environmental samples (groundwater, soil, and sediment) that will be used during this investigation are provided in Appendix D of the General QPP.

1 **QAPP WORKSHEET #13: SECONDARY DATA USES AND LIMITATIONS**

2 The primary sources of data used to generate the history, meteorology, hydrogeology, hydrology,
3 ecological receptors, and AFFF use at Fairchild AFB that are included in this ISWP are identified below.

Data Type	Source	Data Uses Relative to Current Project	Factors Affecting the Reliability of Data and Limitations on Data Use
Geology, hydrology, and hydrogeology; AFFF use; ecological receptors	CH2M HILL, 2015, <i>Final Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force Base, Washington</i> . June.	Provided geologic and hydrogeologic setting and historical and current AFFF use.	Assessments were developed based upon reporting of others and/or interviews of former installation personnel.
Site history	USAF, 2016. <i>Fairchild Air Force Base: A Brief History</i> at www.fairchild.af.mil/About-Us/Fact-Sheets/Display/Article/238991/fairchild-air-force-base-a-brief-history , published 15 March.	Provided base operational history.	None known.

QAPP WORKSHEET #14/16: PROJECT TASKS AND SCHEDULE

To meet the project goals defined in **QAPP Worksheet #11**, the Fairchild AFB SI will include site reconnaissance to determine the scope of sampling activities, as well as the collection of soil and groundwater samples to confirm if a release of PFAS has occurred. The approach to conducting the SI will include the activities identified and described below. Fieldwork will be conducted in accordance with the SOPs provided in Appendix D of the General QPP.

INSTALLATION SCOPING VISITS

An Installation Scoping Visit was held on 27 September 2016 by Amec Foster Wheeler personnel to review available data, interview applicable Fairchild AFB personnel, and visit each proposed AFFF area to identify site-specific sampling locations and constraints. Five potential AFFF areas were identified during the scoping visit and are proposed for further investigation. Refer to **QAPP Worksheet #9** for details.

PRE-MOBILIZATION ACTIVITIES

The following activities will be completed prior to mobilization to Fairchild AFB to perform SI field activities.

Health and Safety Plan Preparation

The Installation-Specific HSP is included in **Appendix A**, and is a supplement to the General HSP found in Appendix A of the General QPP. The HSP will be reviewed and updated, if necessary, prior to field mobilization based on final personnel assignments. The HSP has been prepared in accordance with the Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response Standard (29 Code of Federal Regulations [CFR] 1910.120 CFR).

Amec Foster Wheeler will also review all subcontractor HSPs and training records for subcontracted personnel to ensure compliance with Amec Foster Wheeler's General HSP.

Base Access

Amec Foster Wheeler field personnel and their drilling subcontractor will provide the Fairchild AFB RPM all personal information required for access to Fairchild AFB a minimum of 30 days prior to initiation of field activities. Passes will be obtained at the Fairchild AFB main gate Visitor Center on the first day of mobilization.

Utility Clearance

Amec Foster Wheeler will pre-mark all proposed boring locations. Utility clearance at each location will be obtained by completing the following activities:

- Obtain utility clearances and a dig permit ticket through Inland Empire Utility Coordinating Council (1-800-424-5555 or 811) a minimum of two business days and not more than ten business days prior to mobilization of drilling equipment;
- Notify Fairchild AFB Civil Engineer (CE) department of all utility clearances;

- Review available utility plans for identification of potential utilities in work areas; and
- Clear all intrusive locations by the drilling subcontractor using a hand auger, post-hole digger, or air knife to a minimum depth of 5 ft bgs.

A base-specific dig permit will also be required. Amec Foster Wheeler will stake locations a minimum of one month in advance of field work, and will provide location information to Mr. Connally for dig permit approval; dig permits will be kept on site during field work.

Area-Specific Regulations/Permits

A Federal Aviation Administration (FAA) permit will be obtained for soil boring/monitoring well installations utilizing a drill rig on the active airfield at Fairchild AFB, if required upon consultation with the USAF. Amec Foster Wheeler will submit all required information to Ms. Roberta LaPorte, Airfield Manager, a minimum of 45 days prior to field work initiation, including anticipated field work dates and duration, boring/well Global Positioning System (GPS) coordinates and elevations, drill rig type and mast heights (lowered and raised), and well development method.

Field Readiness Review

Amec Foster Wheeler will conduct a Field Readiness Review that will include the preparation of a checklist to ensure all permits, procurement items, and notifications have been submitted and/or approved. This information will be discussed during a teleconference with the RPM and AFCEC personnel a minimum of two weeks prior to field work mobilization. Notification to the Washington Department of Ecology and USEPA will be provided by the RPM within the applicable timeframe.

MOBILIZATION/DEMOBILIZATION

Three mobilizations to the installation will be required to complete the SI work. The first mobilization will be to sample existing monitoring wells in the FT004 area. The second mobilization will be to mark boring locations and verify utility clearance with the base CE, and the third mobilization will be to advance soil borings and collect soil and groundwater samples.

ENVIRONMENTAL SAMPLING

Soil and/or groundwater samples will be collected at the five identified AFFF release areas at Fairchild AFB. The goal of site-specific sampling is to determine the presence or absence of PFAS within media of concern. **QAPP Worksheets #18-1 through #18-5** and **Figures 3 through 7** provide the sampling details and locations, respectively, for each potential AFFF release area at Fairchild AFB. All environmental samples collected will be analyzed for the 16 PFAS analytical suite listed in **QAPP Worksheet #11**.

One composite surface soil sample and one composite subsurface soil sample per AFFF area where soil is collected for PFAS analysis will also be collected and submitted for geotechnical analyses of physiochemical properties, including soil pH (USEPA Method 9045B), particle size analysis (ASTM D422), and TOC (USEPA 9060 or Lloyd Kahn Method). The General QPP provides the SOPs and descriptions for

sampling activities, while a summary of the proposed field sampling activities is described in the following sections.

Soil Boring Advancement/Abandonment and Soil Sampling

Twelve soil borings will be advanced by a Washington licensed driller using direct push technology (DPT), air rotary, and/or rotosonic drilling methodology to identify the presence or absence of PFAS in soil at the five AFFF release areas at Fairchild AFB, as well as to characterize subsurface conditions. Soil cores will be continuously collected to the appropriate depth or drill cuttings will be collected at discrete depths, screened with a photoionization detector for volatile organic vapors, and logged by a qualified geoscientist in accordance with the Unified Soil Classification System or appropriate rock core descriptions.

Discrete surface and subsurface vadose-zone soil samples will be collected for laboratory analysis from each of the soil borings at specified depths during soil boring advancement. Specific details and procedures related to soil sample collection can be found in SOP AFW-02, *Soil Sampling* (Appendix D, General QPP). The boreholes will be abandoned in accordance with SOP AFW-06, *Borehole Abandonment* (Appendix D, General QPP). **QAPP Worksheets #17 and #18** provide further discussion of sample locations and rationale. Soil sample collection details will be recorded in field logs and soil sample collection logs, while boring lithology will be recorded on drilling logs (Appendix E, General QPP).

Grab Groundwater Sampling from Borings

Where groundwater samples are to be collected from borings, a 2-inch-diameter 0.02-inch machine slotted polyvinyl chloride (PVC) well screen and casing will be temporarily placed in the open borehole or retracted core barrel to the boring total depth. Low-flow groundwater purging and sampling will be conducted using a peristaltic pump fitted with disposable high-density polyethylene tubing. Water levels and quality parameters (pH, specific conductance, temperature, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity) will be periodically measured with a multi-purpose water quality meter and turbidity meter until all parameters stabilize in accordance with SOP AFW-03, *Groundwater Sampling* (Appendix D, General QPP), or until a minimum of 5 borehole volumes of water have been removed or for a maximum of 30 minutes. The water quality parameter measurements will be recorded on groundwater sample collection logs during purging activities. A summary of proposed groundwater samples is provided in **QAPP Worksheet #18**.

Monitoring Well Sampling

Static depth to groundwater measurements will be collected from existing monitoring wells at each site for use in potentiometric level calculation and groundwater contouring prior to initiating groundwater sampling activities. Low-flow groundwater purging and sampling will be conducted from 11 existing monitoring wells with a peristaltic pump fitted with disposable high-density polyethylene tubing. Water levels and quality parameters (pH, specific conductance, temperature, ORP, DO, and turbidity) will be periodically measured with a multi-purpose water quality meter and turbidity meter until all parameters stabilize in accordance with SOP AFW-03, *Groundwater Sampling* (Appendix D, General QPP). The water

levels and quality parameter measurements will be recorded on groundwater sample collection logs during purging activities. A summary of proposed groundwater samples is provided in **QAPP Worksheet #18**.

SURVEYING

Amec Foster Wheeler personnel will locate, survey, and mark all proposed soil boring locations using a handheld GPS unit prior to utility clearance.

POTENTIAL OFF-BASE SAMPLING OF PRIVATE WELLS

As discussed in Section 1.4 and Worksheet #11, it is anticipated that follow-up sampling of known off-base private drinking water wells located east (downgradient) of the base may be needed to identify and verify whether PFAS are present in drinking water at concentrations above USEPA HA values. However, this follow-up off-base sampling will only be conducted in the event PFAS are detected above the USEPA HA values at the eastern base boundary (at FT004 [FT01]). If PFAS are not detected and/or detected at concentrations less than the USEPA HA values, stakeholders will review the sample results and evaluate the need for collection of additional data to confirm the results and the need to sample off-base private wells.

If off-base sampling of private wells is warranted, SOP AFW-15 (Appendix D, General QPP) will guide the process for testing, retesting, and water supply replacement, as applicable. The USAF has preliminarily identified a set of off-base private wells that will be sampled, as shown on **Figure 4**; USAF staff are compiling owner contact information and confirming the presence and status of wells where current information is limited. The USAF will contact owners through a base-specific procedure developed by the USAF Public Affairs Department. The USAF is also confirming options for water supply replacement, should replacement be required based on sampling results.

Sample locations (faucet or outside spigot valve) will be identified as close to the wellhead as possible, without selecting ports too close to the ground or within confined spaces. The port will be opened and allowed to purge (flush) for at least 15 minutes, ensuring the sample will be formation water and not water that has been sitting in the well or associated piping. Water levels and quality parameters (pH, specific conductance, temperature, ORP, DO, and turbidity) will be periodically measured with a multi-purpose water quality meter and turbidity meter until all parameters stabilize in accordance with SOP AFW-13 (Appendix D, General QPP). Samples will be collected in sample containers directly from the port. The water quality parameter measurements will be recorded on groundwater sample collection logs during purging activities.

PFAS SAMPLING CONSIDERATIONS

Given the low detection limits associated with PFAS analysis and the many potential sources of trace levels of PFAS, field personnel will follow strict protocols to help mitigate the potential for false detections of PFAS. A list of prohibited and acceptable clothing/equipment for sampling at PFAS sites is provided in

Table 3 of the General QPP. Specific details and procedures related to sampling for analysis of PFAS can be found in SOP AFW-01, *PFC-Specific Procedures* (Appendix D, General QPP).

INVESTIGATION-DERIVED WASTE MANAGEMENT

IDW will consist of soil cuttings from soil boring advancement, well development water, groundwater sampling purge water, decontamination water, disposable PPE, and other miscellaneous refuse. PPE and other miscellaneous refuse will be placed in plastic bags and discarded in an on-site sanitary trash container for disposal at a sanitary landfill. Soil IDW generated from soil boring and monitoring well installation activities will be placed into Department of Transportation (DOT)-approved 55-gallon, open-top steel drums. Liquid IDW generated from equipment decontamination, and monitoring well development and purging activities will be placed into DOT-approved 55-gallon steel drums. IDW containers will be appropriately labeled with site/contact information and contents, and will be staged in Building 2411 or other area designated by base managers. Based upon waste characterization results, IDW will be profiled and transported off-site by a licensed waste hauler to a permitted disposal facility. A designated USAF representative will oversee IDW loading for transport and disposal and will sign all manifests/bills of lading. Copies of the bills of lading/manifests will be included in the SI Report.

Soil IDW

An aliquot of soil will be collected from each soil core during soil boring advancement and stored in an appropriate container (e.g., 5-gallon bucket with lid or sealable bag). The required sample volume will be collected from the composited soil sample and transferred directly into laboratory-provided containers, labeled, packed on ice in insulated coolers, and delivered under chain-of-custody protocol to the selected laboratory. The sample analytes will be based on the FAFB waste representative requirements and may include all or some of the following to determine the applicable disposal option(s): toxicity characteristic leaching procedure volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, and metals; polychlorinated biphenyls; total petroleum hydrocarbons (gasoline range organics [GRO] and diesel range organics [DRO]); and flashpoint, pH, sulfide, cyanide, and PFAS.

Liquid IDW

The liquid IDW will be segregated into separate containers for monitoring well development/purge water and equipment decontamination water and sampled separately in an effort to reduce the volume of hazardous waste should either waste stream be characterized as such.

An aliquot of water will be collected from each drum of equipment decontamination and monitoring well development and purge water at the conclusion of drilling and sampling activities using a dedicated bailer. The samples will be decanted directly into laboratory-provided containers, labeled, packed on ice in insulated coolers, and delivered under chain-of-custody protocol to the selected laboratory. The sample analytes will be based on the FAFB waste representative requirements and may include all or some of the following to determine the applicable disposal option(s): VOCs, SVOCs, pesticides, herbicides, metals,

1 polychlorinated biphenyls, total petroleum hydrocarbons (GRO and DRO), flashpoint, pH, sulfide, cyanide,
2 and PFAS.

3

4 **PROPOSED SITE INSPECTION SCHEDULE**

5 The projected schedule for completion of SI activities is summarized below.

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
Installation Scoping Visit – A scoping visit was made to the installation to conduct interviews with personnel familiar with AFFF use, review information and inspect potential AFFF release areas, and determine logistical information required for the SI field work.	Amec Foster Wheeler	9/27/16	9/27/16	Scoping visit notes from interviews, activities planned for each of the AFFF release areas, and installation logistical information. Submitted to USAF and USEPA prior to a scoping call on 11/14/16.	11/07/16
UFP-QAPP Installation-Specific Work Plan – This document will be generated using information gathered from the installation scoping visit, including information provided by AFCEC and Fairchild AFB personnel.	Amec Foster Wheeler	9/27/16	12/21/16	UFP-QAPP Installation-Specific Work Plan.	12/21/16
Readiness Review, FT004 (FT01) Monitoring Well Sampling – A readiness review will be conducted prior to mobilization to the installation to ensure that the field crew has the proper sampling equipment, sample containers, PPE, site clearances, sample locations, and any miscellaneous materials necessary to conduct the SI field work.	Amec Foster Wheeler	2/9/17	2/9/17	Results of the readiness reviews will be included in the SI Report.	9/7/17

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
FT004 (FT01) Monitoring Well Sampling – Groundwater samples will be collected from FT004 wells MW-3, MW-225, MW-226, MW-50, and MW-100 to evaluate the impact to groundwater in the area prior to the remaining soil/groundwater investigation tasks.	Amec Foster Wheeler	2/14/17	2/15/17	Results will be provided to AFCEC upon receipt toward determining whether off-base wells will be sampled. Results of the groundwater sampling will also be included in the SI Report.	3/3/17
Readiness Review, Remaining SI – A readiness review will be conducted prior to mobilization to the installation to ensure that the field crew has the proper sampling equipment, sample containers, PPE, site clearances, sample locations, and any miscellaneous materials necessary to conduct the SI field work.	Amec Foster Wheeler	5/1/17	5/1/17	Results of the readiness reviews will be included in the SI Report.	9/7/17
Utility Clearance – All soil boring locations will be located and marked, and verified to ensure no underground utilities will be compromised.	Amec Foster Wheeler	4/10/17	4/10/17	Description of the utility clearance activities will be included in the SI Report.	9/7/17
SI Subsurface Field Activities – Field activities will be conducted at the five AFFF release areas, including collection of soil and groundwater samples for PFAS analysis.	Amec Foster Wheeler and Subcontracted Drilling Company	5/8/17	5/21/16	SI field information will be included in the SI Report.	9/7/17
Laboratory Data Validation – Validation of the field sampling analytical data will be conducted for each sample data group.	Amec Foster Wheeler	5/21/17	6/17/17	Information to be included in the SI Report.	9/7/17
ERPIMS – Upload field and analytical data to ERPIMS	Amec Foster Wheeler	7/7/17	7/7/17	Information to be uploaded following data validation	7/7/17

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
SI Report – This report will be prepared based upon the data generated during the SI field activities, and will include geology/hydrogeology, CSM, sampling locations and depths, validated analytical results, and comparison of results to project action limits for the determination of whether a PFAS release has occurred in environmental media at each area.	Amec Foster Wheeler	5/8/17	9/7/17	SI Report.	9/7/17

Notes:

AFB - Air Force Base
AFCEC - Air Force Civil Engineer Center
AFFF - aqueous film forming foam
DD – day
MM - month
YY - year

PPE - personal protective equipment
QAPP - quality assurance project plan
RPM - Remedial Project Manager
SI - Site Inspection
UFP - Uniform Federal Policy
PFAS - per- and polyfluorinated alkyl substances

QAPP WORKSHEET #17: SAMPLING DESIGN AND RATIONALE

PROPOSED SCOPE OF WORK

Amec Foster Wheeler has developed a sampling program designed to evaluate the potential release of AFFF from FTAs, firefighting equipment testing areas, aircraft crash sites, and AFFF discharge locations at Fairchild AFB. The sampling plan is based on:

- Discussions between Amec Foster Wheeler and AFCEC during the installation visit on 27 September 2016;
- Review of background documents; and
- Development of a preliminary base-wide CSM (**QAPP Worksheet #10**).

Sampling at Fairchild AFB is being performed at the locations most likely to have been previously impacted with AFFF from USAF activities, as well as from selected existing monitoring wells located hydraulically downgradient of AFFF release areas. The sampling rationale and locations for each of the five AFFF release areas are detailed below. The proposed number of samples by medium (surface soil, subsurface soil, and groundwater) to be collected at each AFFF release area described above is summarized in **Table 4**.

AFFF Release Area 1: FT004 (FT01)

Soil samples will be collected from two borings advanced within and down-gradient from former burn pit excavation area. Soil from the boring within the former burn pit excavation will be sampled below the excavation fill material at approximately 4 ft bgs. The downgradient boring will be located adjacent to the former OWS discharge location, where both surface and subsurface soil will be sampled. Groundwater samples will also be collected from existing shallow monitoring well MW-3 located near the source area and shallow monitoring wells MW-225, MW-226, MW-50, and MW-100 located downgradient of the former burn pit near the installation boundary. The samples from the installation boundary are to evaluate whether PFAS above HA levels are likely migrating off-base toward downgradient private supply wells. The proposed soil and groundwater sample locations for FT004 (FT01) are illustrated on **Figure 3**.

If concentrations of PFAS in the boundary wells (MW-225, MW-226, MW-50, and/or MW-100) exceed HA levels, the USAF will contact private well owners to arrange for sampling off-base private supply wells to determine the presence or absence of PFAS. If concentrations of PFAS are not detected or are detected at concentrations less than HA levels, stakeholders will review the sample results and evaluate the need for collection of additional data to confirm the results and the need to sample off-base private wells. Off-base private supply wells near FT004 (FT01) are illustrated on **Figure 4**.

AFFF Release Area 2: Calibration Area

Surface and subsurface soil samples and one groundwater sample will be collected from two borings located south of the current FTA where equipment calibration was performed. The proposed soil and groundwater sample locations for the current FTA are illustrated on **Figure 3**.

AFFF Release Area 3: Aircraft Crash Location SS008 (PS-4/9)

Surface and subsurface soil samples will be collected from three borings located in the crash area boundary. Groundwater samples will be collected from three existing shallow groundwater monitoring wells within and immediately downgradient from the crash location (wells MW-438, MW-265, and MMW-1023-1) and one deep well completed in weathered basalt (well MW-185). The proposed soil and groundwater sample locations for the aircraft crash location SS008 (PS-4/9) are illustrated on **Figure 5**.

AFFF Release Area 4: B52 Crash Location 1994

Surface and subsurface soil samples will be collected from three borings located in the crash area boundary. A groundwater sample will be collected from two of the three borings and from an existing shallow monitoring well, MW-451. The proposed soil and groundwater sample locations for the B52 crash location 1994 are illustrated on **Figure 6**.

AFFF Release Area 5: Fire Station 1 (Building 3)

Surface and subsurface soil samples will be collected from two borings in the vicinity of the curb gap and within a topographic low point in the grassy area at Fire Station 1. A groundwater sample will be collected from the boring in the vicinity of the curb gap (FS1-SB-1), and a second groundwater sample will be collected from existing shallow monitoring well MW-399. If PFAS are detected in soil and groundwater at this location, the stakeholders will review the results and the need for additional investigation. The proposed soil and groundwater sample locations are illustrated on **Figure 3**.

Off-Base Private Well Sampling

Private well sampling will be conducted at an estimated 25 wells located downgradient of FT004. The final number of private wells to be sampled will be based on information obtained about the private wells during the SI. The proposed private well sampling locations are illustrated on **Figure 4**.

1 **Table 4. Proposed Samples per Medium at Each AFFF Release Area.**

Site	Surface Soil Samples	Subsurface Soil Samples	Groundwater Samples	Drinking Water Samples
FT004 (FT01) (AFFF Release Area 1)	1	3	5	25
Calibration Area (AFFF Release Area 2)	2	2	1	0
Aircraft Crash Location SS008 (PS-4/9) (AFFF Release Area 3)	3	3	4	0
B-52 Crash Location 1994 (AFFF Release Area 4)	3	3	3	0
Fire Station 1 (Building 3) (AFFF Release Area 5)	2	2	2	0
Total Regular Samples	11	13	15	25
Field Duplicates	1	2	2	3
Matrix Spike/Matrix Spike Duplicates	1	1	1	2
Equipment Rinsate Blanks	1	1	2	2
Field Blanks	1	1	2	25
Total Samples	15	18	22	57

- 2 **Notes:**
3 AFFF - aqueous film forming foam

QAPP WORKSHEET #18-1: SAMPLING LOCATIONS AND METHODS
AFFF RELEASE AREA 1: FT004 (FT01)

Sample locations are illustrated on Figure 3. The proposed sampling summary for AFFF Release Area 1 is presented below.

Location ID	Sample ID	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Method	New or Existing Location	Sample Rationale
FRCHD01-SB-1	FRCHD01-SO-001	Subsurface Soil	4	4.5	DPT	New	Assess PFAS presence in soil beneath the former burn pit excavation.
	FRCHD01-SO-002	Subsurface Soil	5 ^a	15 ^a	DPT	New	
FRCHD01-SB-2	FRCHD01-SO-003	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil adjacent to the former burn pit excavation.
	FRCHD01-SO-004	Subsurface Soil	5 ^a	15 ^a	DPT	New	
MW_3	FRCHD01-GW-001	Groundwater	4	9	PP	Existing	Assess PFAS presence in groundwater near the former burn pit
MW_225	FRCHD01-GW-002	Groundwater	6	16	PP	Existing	Assess PFAS presence in groundwater at the downgradient installation boundary.
MW_226	FRCHD01-GW-003	Groundwater	15	16	PP	Existing	Assess PFAS presence in groundwater at the downgradient installation boundary.
MW_50	FRCHD01-GW-004	Groundwater	6	16	PP	Existing	Assess PFAS presence in groundwater at the downgradient installation boundary.
MW_100	FRCHD01-GW-005	Groundwater	43.1	53.4	PP	Existing	Assess PFAS presence in deeper groundwater at the downgradient installation boundary.

Notes:

^a Subsurface soil samples will be collected above the groundwater interface or above bedrock, whichever is shallower. Actual sampling depth will be determined in the field during drilling operations.

GW – groundwater

PFAS – per- and polyfluorinated alkyl substances

TBD – to be determined

ID – identification

PP – peristaltic pump

MW – monitoring well

SO – soil

QAPP WORKSHEET #18-2: SAMPLING LOCATIONS AND METHODS
AFFF RELEASE AREA 2: CALIBRATION AREA

Sample locations are illustrated on Figure 3. The proposed sampling summary for AFFF Release Area 2 is presented below.

Location ID	Sample ID	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Method	New or Existing Location	Sample Rationale
FRCHD02-SB-1	FRCHD02-SO-001	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil at current FTA calibration area.
	FRCHD02-SO-002	Subsurface Soil	5 ^a	15 ^a	DPT	New	
FRCHD02-SB-2	FRCHD02-SO-003	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil and groundwater at current FTA calibration area.
	FRCHD02-SO-004	Subsurface Soil	5 ^a	15 ^a	DPT	New	
	FRCHD02-GW-001	Groundwater	TBD ^b	TBD ^b	PP	New	

Notes:

^a Subsurface soil samples will be collected above the groundwater interface or above bedrock, whichever is shallower. Actual sampling depth will be determined in the field during drilling operations.

^b Sample collection depth will be based on depth to groundwater determined in the field during drilling operations.

AFFF – aqueous film forming foam

DPT – direct push technology

ft bgs – feet below ground surface

FTA = Fire Training Area

GW – groundwater

ID – identification

PFAS – per- and polyfluorinated alkyl substances

PP – peristaltic pump

SO – soil

TBD – to be determined

QAPP WORKSHEET #18-3: SAMPLING LOCATIONS AND METHODS
AFFF RELEASE AREA 3: AIRCRAFT CRASH LOCATION SS008 (PS-4/9)

Sample locations are illustrated on Figure 5. The proposed sampling summary for AFFF Release Area 3 is presented below.

Location ID	Sample ID	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Method	New or Existing Location	Sample Rationale
FRCHD03-SB-1	FRCHD03-SO-001	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil within crash area boundary.
	FRCHD03-SO-002	Subsurface Soil	5 ^a	15 ^a	DPT	New	
FRCHD03-SB-2	FRCHD03-SO-003	Surface Soil	0	0.5	Hand Auger	New	
	FRCHD03-SO-004	Subsurface Soil	5 ^a	15 ^a	DPT	New	
FRCHD03-SB-3	FRCHD03-SO-005	Surface Soil	0	0.5	Hand Auger	New	
	FRCHD03-SO-006	Subsurface Soil	5 ^a	15 ^a	DPT	New	
MW_438	FRCHD03-GW-001	Groundwater	7.5	12.5	PP	Existing	Assess PFAS presence in groundwater downgradient from crash area.
MW_265	FRCHD03-GW-002	Groundwater	10	20	PP	Existing	
MMW_1023-1	FRCHD03-GW-003	Groundwater	20	25	PP	Existing	
MW_185	FRCHD03-GW-004	Groundwater	47	62	PP	Existing	

Notes:

^a Subsurface soil samples will be collected above the groundwater interface or above bedrock, whichever is shallower. Actual sampling depth will be determined in the field during drilling operations.

AFFF – aqueous film forming foam

GW – groundwater

PFAS – per- and polyfluorinated alkyl substances

SO – soil

DPT – direct push technology

ID – identification

PP – peristaltic pump

TBD – to be determined

ft bgs – feet below ground surface

MW – monitoring well

SB – soil boring

QAPP WORKSHEET #18-4: SAMPLING LOCATIONS AND METHODS
AFFF RELEASE AREA 4: B-52 CRASH LOCATION 1994

Sample locations are illustrated on Figure 6. The proposed sampling summary for AFFF Release Area 4 is presented below.

Location ID	Sample ID	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Method	New or Existing Location	Sample Rationale
FRCHD04-SB-1	FRCHD04-SO-001	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil and groundwater in crash area boundary.
	FRCHD04-SO-002	Subsurface Soil	5 ^a	15 ^a	Air Rotary or Sonic	New	
	FRCHD04-GW-001	Groundwater	TBD ^b	TBD ^b	PP	New	
FRCHD04-SB-2	FRCHD04-SO-003	Surface Soil	0	0.5	Hand Auger	New	
	FRCHD04-SO-004	Subsurface Soil	5 ^a	15 ^a	Air Rotary or Sonic	New	
FRCHD04-SB-3	FRCHD04-SO-005	Surface Soil	0	0.5	Hand Auger	New	
	FRCHD04-SO-006	Subsurface Soil	5 ^a	15 ^a	Air Rotary or Sonic	New	
	FRCHD04-GW-002	Groundwater	TBD ^b	TBD ^b	PP	New	
MW_451	FRCHD-04-GW-003	Groundwater	9	19	PP	Existing	Assess PFAS presence in groundwater downgradient from crash area.

Notes:

^a Subsurface soil samples will be collected above the groundwater interface or above bedrock, whichever is shallower. Actual sampling depth will be determined in the field during drilling operations.

^b Sample collection depth will be based on depth to groundwater determined in the field during drilling operations.

AFFF – aqueous film forming foam

DPT – direct push technology

ft bgs – feet below ground surface

ID – identification

PFAS – per- and polyfluorinated alkyl substances

GW – groundwater

SB – soil boring

TBD – to be determined

PP – peristaltic pump

SO – soil

QAPP WORKSHEET #18-5: SAMPLING LOCATIONS AND METHODS
AFFF RELEASE AREA 5: FIRE STATION 1 (BUILDING 3)

Sample locations are illustrated on Figure 5. The proposed sampling summary for AFFF Release Area 5 is presented below.

Location ID	Sample ID	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Method	New or Existing Location	Sample Rationale
FRCHD05-SB-1	FRCHD05-SO-001	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil and groundwater near curb gab that receives drainage during calibration testing.
	FRCHD05-SO-002	Subsurface Soil	5 ^a	15 ^a	DPT	New	
	FRCHD05-GW-001	Groundwater	TBD ^b	TBD ^b	PP	New	
FRCHD05-SB-2	FRCHD05-SO-003	Surface Soil	0	0.5	Hand Auger	New	Assess PFAS presence in soil in topographic low point in grassy area that receives drainage during calibration testing.
	FRCHD05-SO-004	Subsurface Soil	5 ^a	15 ^a	DPT	New	
MW_399	FRCHD05-GW-002	Groundwater	7	17	PP	Existing	Assess PFAS presence in groundwater downgradient of potential source area.

Notes:

^a Subsurface soil samples will be collected above the groundwater interface or above bedrock, whichever is shallower. Actual sampling depth will be determined in the field during drilling operations.

^b Sample collection depth will be based on depth to groundwater determined in the field during drilling operations.

AFFF – aqueous film forming foam

DPT – direct push technology

ft bgs – feet below ground surface

GW – groundwater

ID – identification

MW – monitoring well

PFAS – per- and polyfluorinated alkyl substances

PP – peristaltic pump

SD – sediment

SO – soil

TBD – to be determined

QAPP WORKSHEET #20: FIELD QC SUMMARY

The installation wide field QC summary is presented below. Field duplicate and matrix spike/matrix spike duplicate (MS/MSD) frequencies are determined based on the total number of samples for each medium. Equipment rinsate blanks will be collected at a rate of one per non-dedicated piece of equipment, per day, per crew. As a result, the number of equipment rinsate blanks will be determined in the field. Field blanks will be determined in the field based on the sources of PFAS-free water and, in the case of off-base private wells, number of sampling locations. The values provided below are therefore estimates.

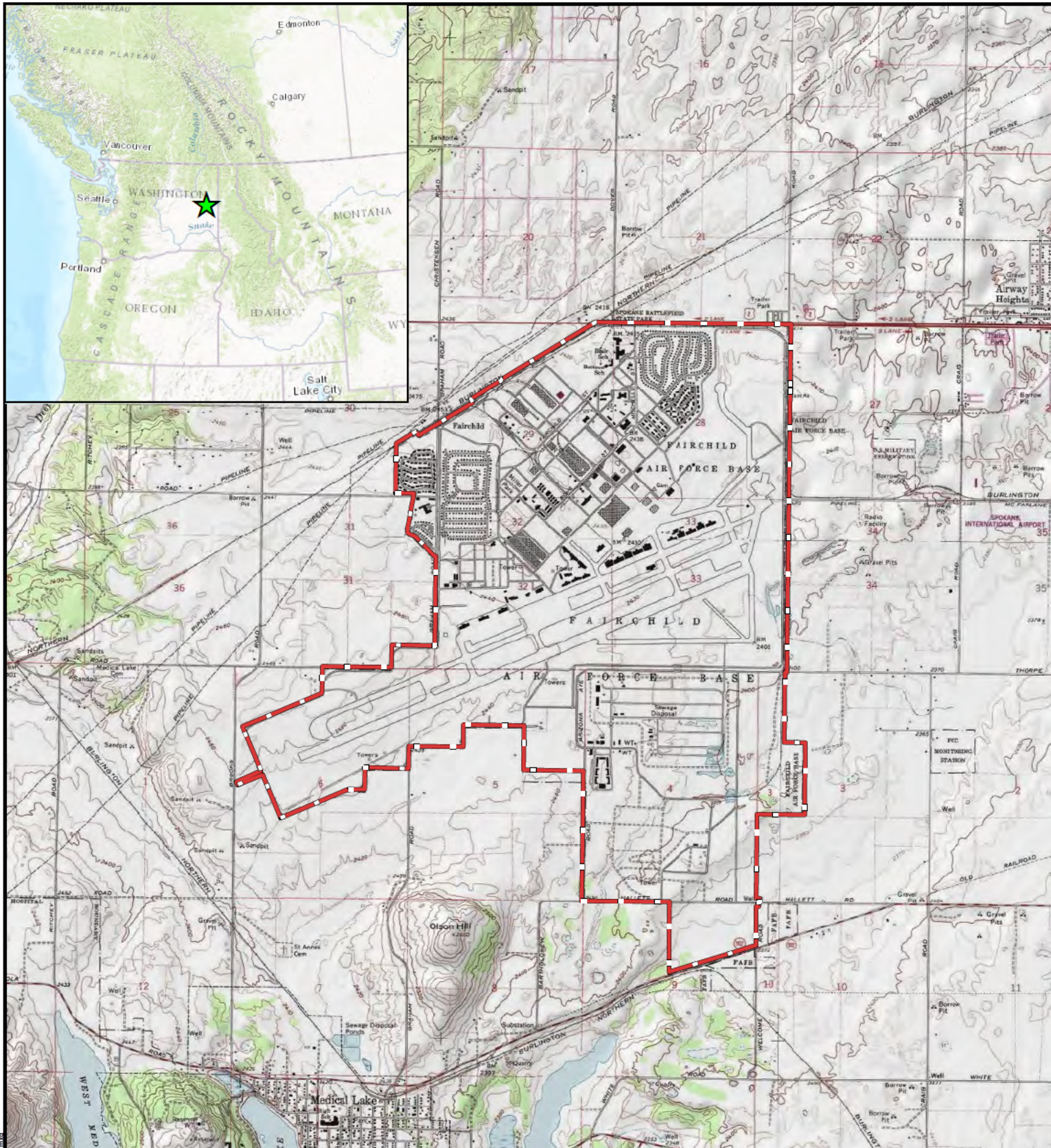
Matrix	Analyte	Regular Samples	Field Duplicates (1:10)	Equipment Rinsate (1:10 for each piece of equipment per day)	Field Blanks (1 per lot of PFAS-free water)	MS/MSDs (1:20)	Total Samples
Soil	PFAS	24	3	2	2	2	33
Groundwater	PFAS	15	2	2	2	1	22
Drinking Water	PFAS	25	3	2	25*	2	57
TOTALS		64	8	6	29	5	112

Notes:

* One field blank per sampling location

MS/MSD – matrix spike/matrix spike duplicate

PFAS – per- and polyfluorinated alkyl substances



Air Force Civil Engineer Center



2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236



Project: 775303101

By: SD

Date: 4/10/2017

0 2,000 4,000 Feet

Symbol Key



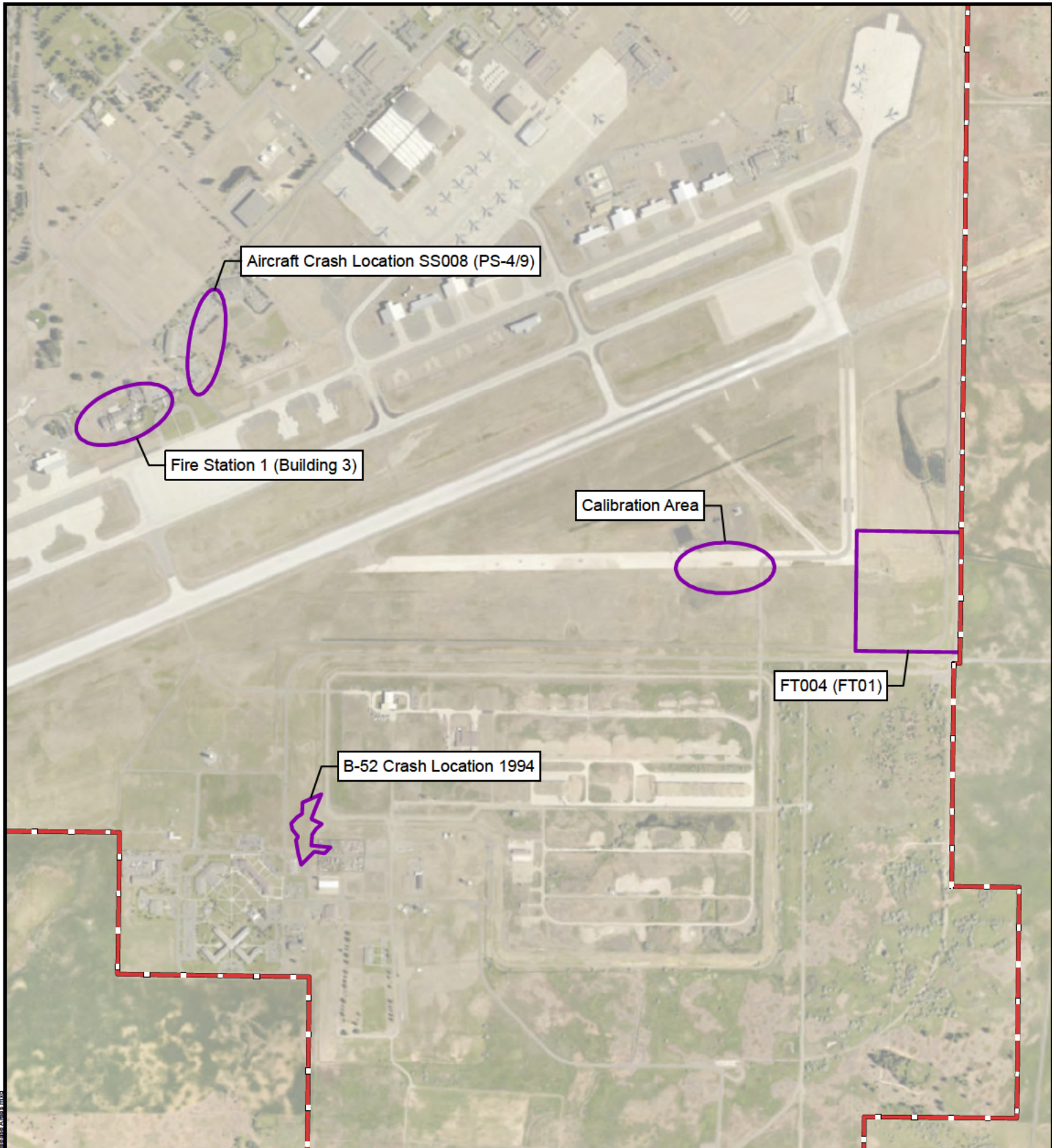
Fairchild AFB Installation Boundary

Disclaimer: For general reference purposes only.
This is not a survey product.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

Sources: Esri, HERE, DeLorme, Intermap,
increment P Corp., GEBCO, USGS, FAO,
NPS, NRCAN, GeoBase, IGN, Kadaster
NL, Ordnance Survey, Esri Japan, METI,

FIGURE 1
Site Location Map
Fairchild Air Force Base
Spokane, Washington

Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan



Air Force Civil Engineer Center



2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236



Project: 775303101

By: SD

Date: 4/10/2017

0 750 1,500 Feet

Symbol Key

Potential AFFF Release Area

Fairchild AFB Installation Boundary

Disclaimer: For general reference purposes only.
This is not a survey product.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

Source: Esri, DigitalGlobe, GeoEye,
Earthstar Geographics, CNES/Airbus DS,
USDA, USGS, AeroGR D, IGN, and the
GIS User Community

FIGURE 2
Proposed AFFF Release Areas
for Site Inspection
Fairchild Air Force Base
Spokane, Washington

Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan

Path: K:\AFCEETO 004 PFCa\Fairchild\dwg\Figure 3-6 - Proposed Sampling Locations.mxd

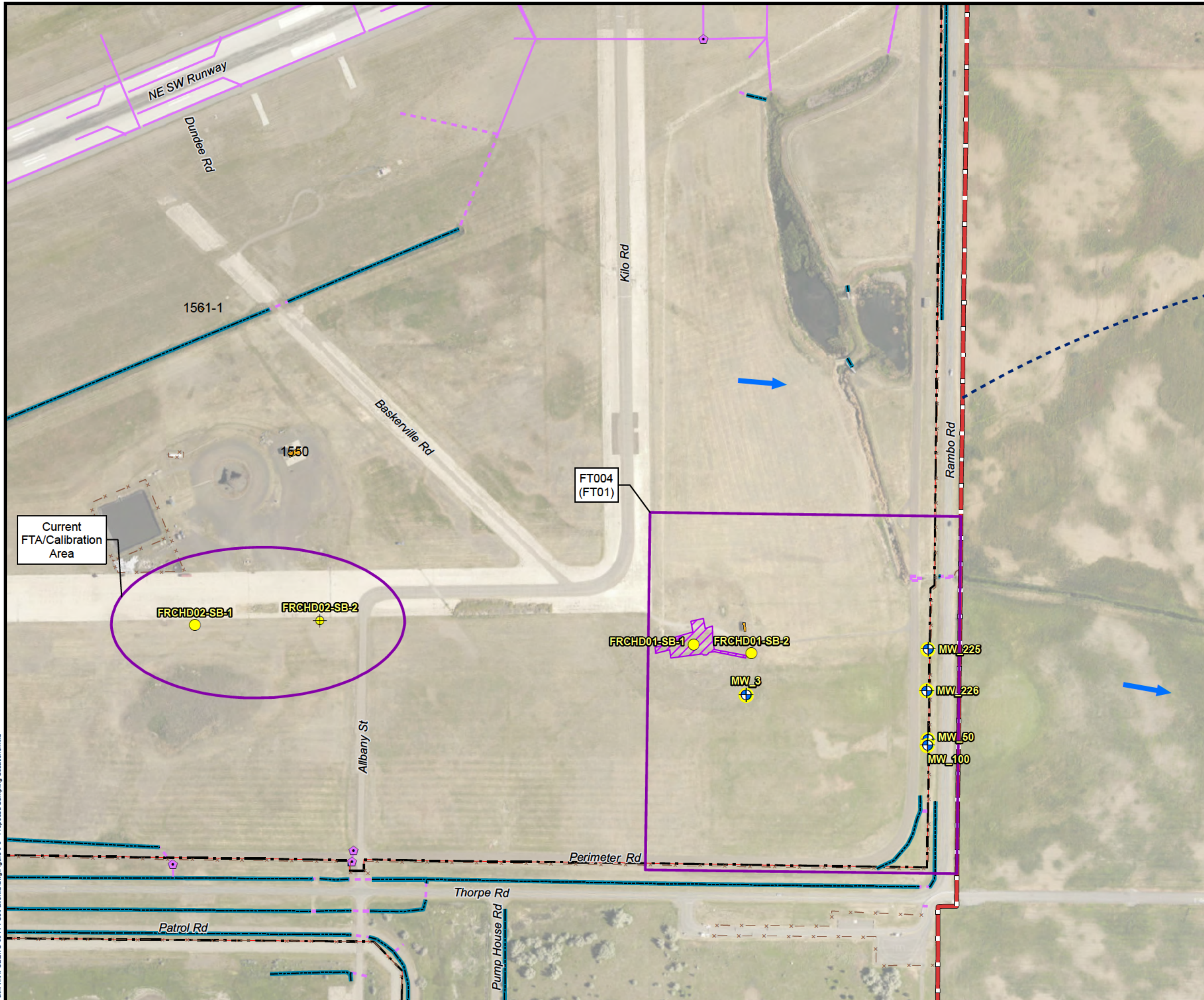


FIGURE 3
Proposed Sampling Locations
FT004 (FT01) and Calibration Area
AFFF Release Areas 1 and 2
Fairchild Air Force Base
Spokane, Washington

Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan

Air Force Civil Engineer Center



2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236

Symbol Key

- Existing Monitoring Well (to be sampled)
- Proposed Soil Boring
- Proposed Temporary Well / Groundwater Grab Sample
- Storm Drain Inlet
- Storm Line
- Storm Open Drainage
- Storm Culvert
- Approximate Uppermost, Shallow Groundwater Flow Direction*
- Proposed Sampling Area
- Potential AFFF Release Area
- Fairchild AFB Installation Boundary
- Limits of Historical Excavation
- Fences
- Building
- Security Area

*Source: Figures 3,5,6 - Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force Base, Spokane, Washington, by CH2MHill, June 2015;
Figure 4 - AECOM Geologic Features Map (undated) provided by Air Force Civil Engineer Center.



Project: 775303101

Date: 4/10/2017

By:SD

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: For general reference purposes only.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

0 150 300 600
Ft.

Path: K:\AFCEETO 004 PFCs\Fairchild\dwg\Figure 3-6 - Proposed Sampling Locations.mxd

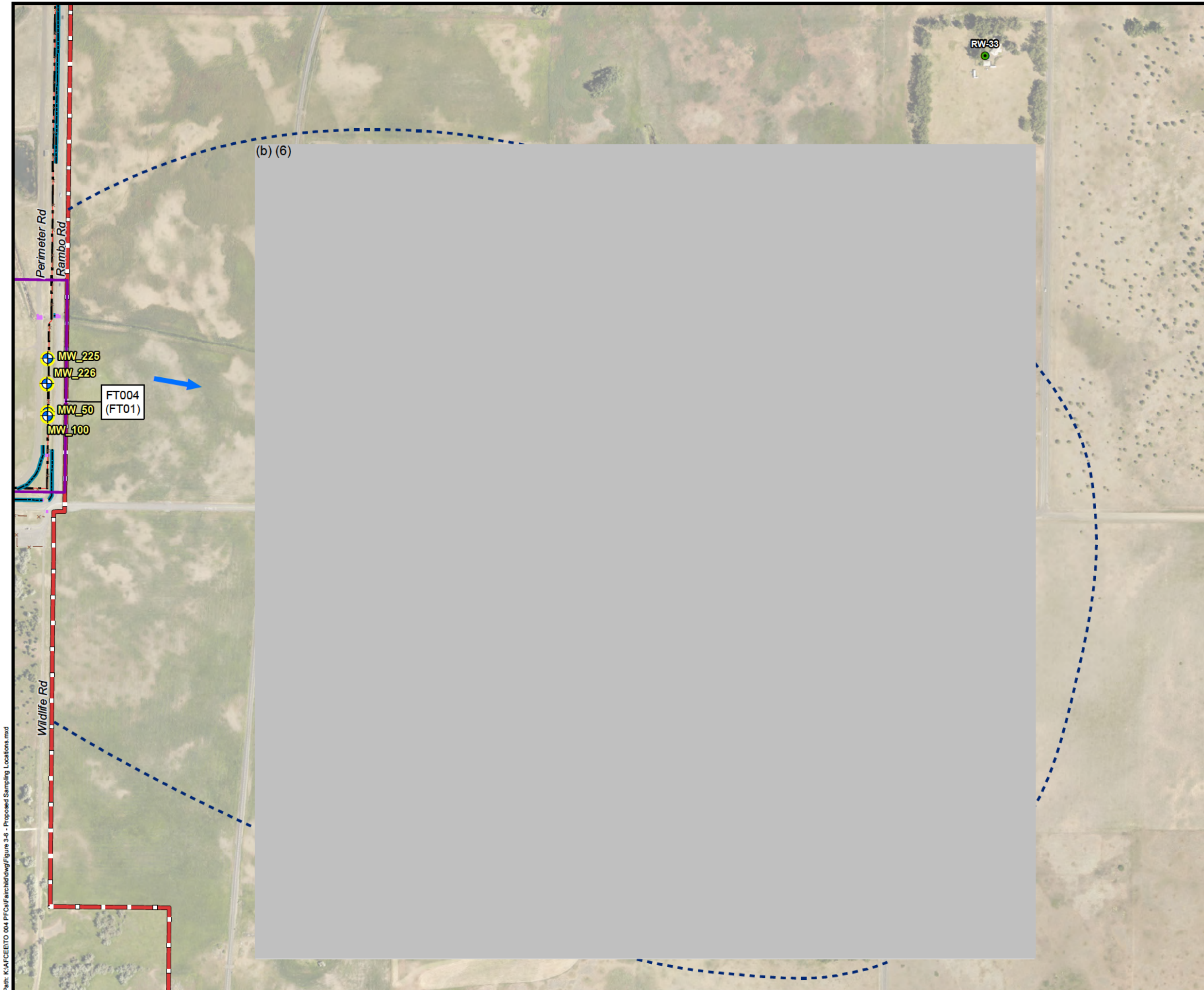



FIGURE 4
Proposed Sampling Locations
FT004 (FT01) and Downgradient Off-Site Wells
AFFF Release Area 1
Fairchild Air Force Base
Spokane, Washington














Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan

Air Force Civil Engineer Center




2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236

Symbol Key

	Existing Monitoring Well (to be sampled)		Fences
	Private Well		Security Area
	Private Well (abandoned)		
	Monitoring Well		
	Storm Line		
	Storm Open Drainage		
	Storm Culvert		
	Approximate Uppermost, Shallow Groundwater Flow Direction*		
	Proposed Sampling Area		
	Potential AFFF Release Area		
	Fairchild AFB Installation Boundary		

*Source: Figures 3,5,6 - Preliminary Assessment Report for
Perfluorinated Compounds at Fairchild Air Force Base, Spokane,
Washington, by CH2MHill, June 2015;
Figure 4 - AECOM Geologic Features Map (undated) provided by
Air Force Civil Engineer Center.



Project: 775303101

Date: 4/10/2017	By:SD
-----------------	-------

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye,
Earthstar Geographics, CNES/Airbus DS, USDA, USGS,
AeroGRID, IGN, and the GIS User Community

Disclaimer: For general reference purposes only.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

0 150 300 600
Ft.

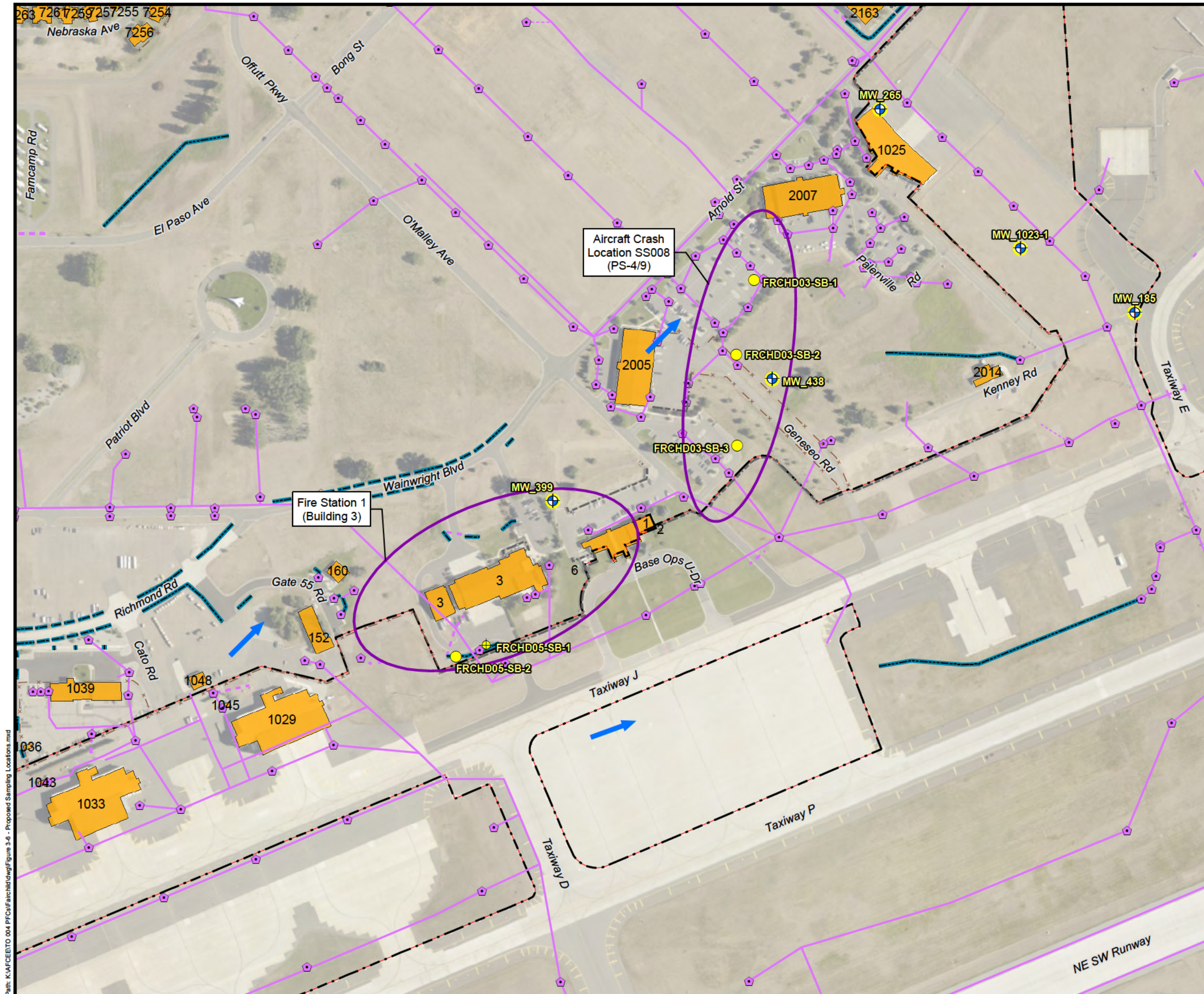


FIGURE 5
Proposed Sampling Locations
Aircraft Crash Location SS008 (PS-4/9) and Fire
Station 1 (Building 3)
AFFF Release Areas 3 and 5
Fairchild Air Force Base
Spokane, Washington

Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan

Air Force Civil Engineer Center



2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236

Symbol Key

- | | | | |
|--|--|--|---------------|
| | Existing Monitoring Well (to be sampled) | | Fences |
| | Proposed Soil Boring | | Wall |
| | Proposed Temporary Well / Groundwater Grab Sample | | Building |
| | Storm Drain Inlet | | Security Area |
| | Storm Line | | |
| | Storm Line (abandoned) | | |
| | Storm Open Drainage | | |
| | Storm Culvert | | |
| | Approximate Uppermost, Shallow Groundwater Flow Direction* | | |
| | Potential AFFF Release Area | | |

*Source: Figures 3,5,6 - Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force Base, Spokane, Washington, by CH2MHill, June 2015;
Figure 4 - AECOM Geologic Features Map (undated) provided by Air Force Civil Engineer Center.



Project: 775303101

Date: 4/10/2017

By:SD

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: For general reference purposes only.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

0 150 300 600
Feet

Path: K:\AFCEETO 004 PFCs\Fairchild\Figure 3-6 - Proposed Sampling Locations.mxd

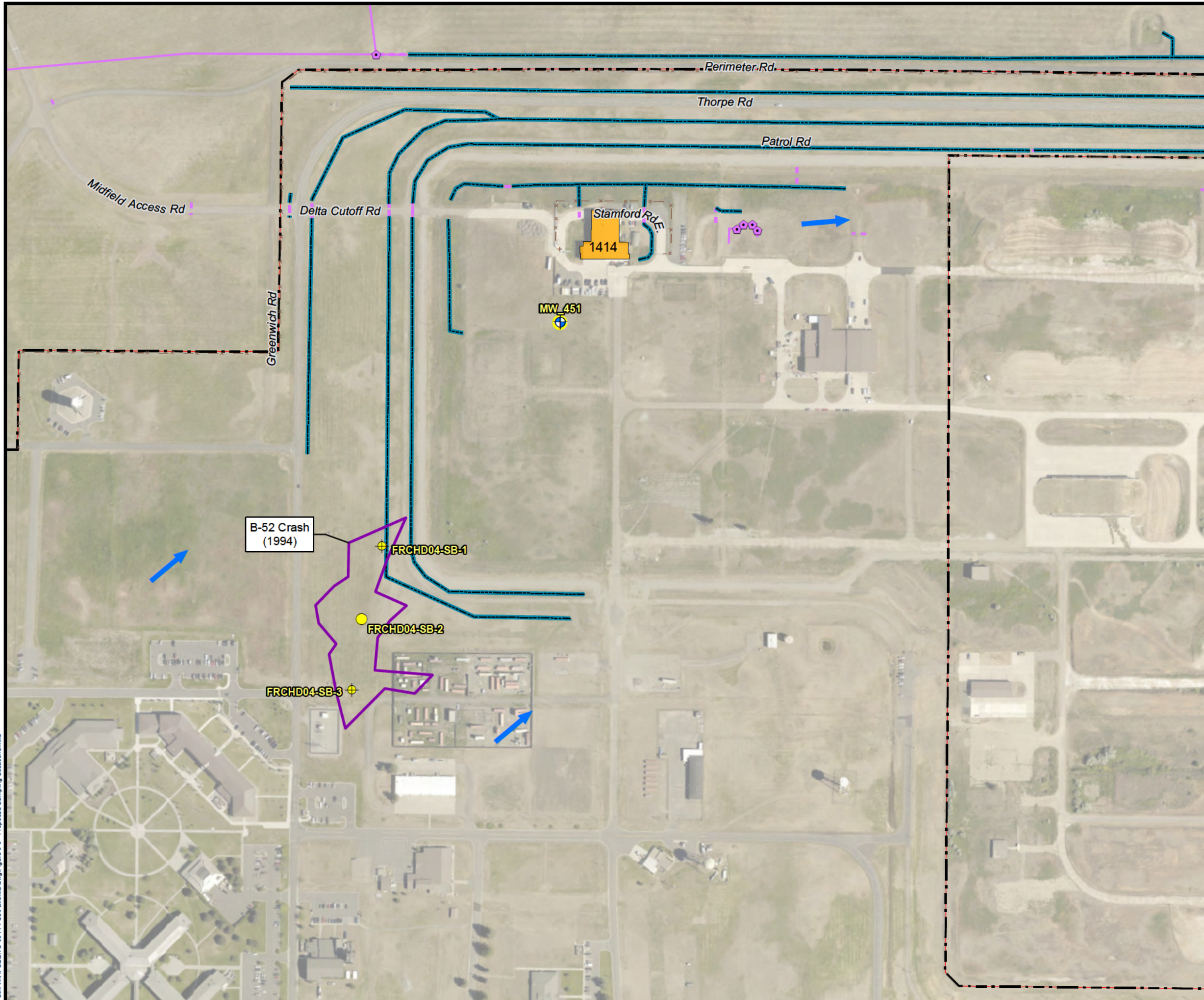


FIGURE 6
Proposed Sampling Locations
B-52 Crash Location 1994
AFFF Release Area 4
Fairchild Air Force Base
Spokane, Washington

Site Inspection of
Aqueous Film Forming Foam (AFFF)
Release Areas
Environmental Programs Worldwide
Installation-Specific Work Plan

Air Force Civil Engineer Center



2261 Hughes Avenue
Building 171, Suite 155
JBSA Lackland, Texas 78236

Symbol Key

- | | | | |
|--|--|--|---------------|
| | Existing Monitoring Well (to be sampled) | | Fences |
| | Proposed Soil Boring | | Building |
| | Proposed Temporary Well / Groundwater Grab Sample | | Security Area |
| | Storm Drain Inlet | | |
| | Storm Line | | |
| | Storm Open Drainage | | |
| | Storm Culvert | | |
| | Approximate Uppermost, Shallow Groundwater Flow Direction* | | |
| | Potential AFFF Release Area | | |

*Source: Figures 3,5,6 - Preliminary Assessment Report for Perfluorinated Compounds at Fairchild Air Force Base, Spokane, Washington, by CH2MHill, June 2015;
Figure 4 - AECOM Geologic Features Map (undated) provided by Air Force Civil Engineer Center.



Project: 775303101

Date: 4/10/2017

By:SD

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Disclaimer: For general reference purposes only.
DO NOT USE to determine, certify, or verify
map features, scale and/or other information.

0 150 300 600
Ft.

APPENDIX A

Installation-Specific Health and Safety Plan

The Installation-Specific HSP provided in this appendix supplement the General HSP included as Appendix A to the General QPP. Refer to the HSP and QPP for all job hazard analyses, site control requirements, personal protective equipment needs, safety mitigation measures, and standard operating procedures.

Site: Fairchild AFB, Spokane, Washington

Prepared by: Joe Fassio

Date: 2/28/2017

Reviewed by: Bethany Flynn

Date: 2/28/2017

Dates of Required Training and Medical Surveillance:

Job duties	Field Team Lead/HSO	Field Team	Technical Lead
Name	Joe Fassio	Gabi Ferreira	Teresa Wilson
First Aid	5/22/2015	8/28/2016	8/28/2016
CPR	5/22/2015	8/28/2016	8/28/2016
Hazard Communication	7/12/1990	--	1/4/2012
HAZWOPER	2/7/2017	2/7/2017	9/13/2016

At least one worker must be trained in First Aid/CPR and should receive bloodborne pathogen training.
Required for Field Lead and Site Health and Safety Officer.

Notes:

CPR – cardiopulmonary resuscitation

HAZWOPER – hazardous waste operations and emergency response

HSO – health and safety officer

NA – not available

Known or Suspected Contaminants (include permissible exposure limits [PELs]/threshold limit values [TLVs]):

Contaminants of Concern (COC) (Attach Fact Sheets*)	Maximum Concentrations		PEL/TLV
	Soil (mg/kg)	Water/Groundwater (µg/L)	
PFAS	n/a (PFOS)	n/a (PFOA)	N/A
Benzene	n/a	<1.0	1 ppm
Toluene	n/a	<1.0	200 ppm
Ethylbenzene	n/a	<1.0	100 ppm
Xylenes	n/a	<1.0	100 ppm
cis-1,2-Dichloroethene	n/a	<1.0	100 ppm
Trichloroethene	n/a	<1.0	100 ppm
Vinyl Chloride	n/a	<0.5	1 ppm

Note:

µg/L – micrograms per liter

mg/kg – milligrams per kilogram

N/A = not applicable

PEL – permissible exposure limit

PFAS – per- and polyfluorinated alkyl substances

PFOA – perfluorooctanoic acid

PFOS – perfluorooctanesulfonic acid

ppm – parts per million

TLV – threshold limit value

n/a – not available

1 **EMERGENCY CONTACTS**

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital: Deaconess Hospital 800 West 5th Avenue, Spokane, WA 99204	509-458-5800		
Police/Ambulance/Fire:	911		
Client Contact: Marc Connally	(O): 509-247-8148	(b) (6)	
Client Contact (Alternate): Ed Zuelke	(O): 509-247-8152		
Regional Lead: Bethany Flynn	(O): 707-793-3834		
Site Health And Safety Officer: Joe Fassio	(O): 503-639-3400		
Group Health Safety and Environment (HSE) Manager: Chad Barnes	(O): 602-733-6000		

2

1 EMERGENCY PROCEDURES

- The health and safety officer (HSO) or alternate should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the project manager and client contact of the emergency. The HSO shall then contact the group health, safety, and environment (HSE) manager who will then contact the corporate HSE manager.
- If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including self-contained breathing apparatus (SCBA) if available, should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and wash affected area. Site worker should shower as soon as possible after incident.
- If a worker is injured, first aid shall be administered by certified first aid provider. See Amec Foster Wheeler Triage Program below
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe. Entry will be using Level B PPE and utilize appropriate monitoring equipment to verify that the site is safe.
- Within 24 hours after any emergency response, the Incident Analysis Report (and Vehicle Incident Report if vehicle incident) shall be completed and returned to the group HSE manager, who will forward a copy to the corporate HSE manager. Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug and alcohol test.

Amec Foster Wheeler WorkCare Program

- If the emergency involves an injury to an Amec Foster Wheeler employee, the local HSE coordinator, field lead are to implement the Amec Foster Wheeler WorkCare program. Employees whose injuries are true emergencies and who need immediate medical attention will initially bypass this program and are to be immediately sent/taken to the hospital identified in the routes to emergency medical facilities section below.
- For non-emergency injuries, the supervisor field lead and the injured employee will contact the Amec Foster Wheeler WorkCare 24/7 Hotline at 1-888-449-7787 and speak to a nurse case manager. The nurse case manager will perform the intake process and ask for information including the following:
 - Explain the process to the caller
 - Determine the nature of the concern
 - Provide appropriate medical advice to the caller
 - Determine the appropriate path forward with the caller
 - Maintain appropriate medical confidentiality
 - Help caller to execute path forward – including a referral to the appropriate local medical facility
 - Send an email notification to the corporate safety contact
- From this, a collaborative decision will be made between the nurse case manager and the injured employee on the most appropriate place for treatment; either the hospital, the clinic, or onsite first aid
- If the employee is to be sent to a clinic or hospital, the nurse will call ahead to explain the situation, the need for testing, and advises options to avoid OSHA recordable & considerations for return to work & transitional/modified duty. The nurse will also arrange for drug and alcohol testing to be conducted at the hospital/clinic. If the employee is to be treated on site (First Aid), the nurse will advise the employee to call if injury gets worse. Attached is a flow diagram that describes this procedure.

Incident flow chart

Call immediately



E&I Corporate HSE department contact list

Name/email	Office location	Contact information
Bruce Voss bruce.voss@amecfw.com	Cathedral City, CA	760.202.3737 (office) (b) (6) (cell)
Chad Barnes chad.barnes@amecfw.com	Phoenix, AZ	602.733.6000 (office) (b) (6) (cell)
Cindy Sundquist cynthia.sundquist@amecfw.com	Portland, ME	207.828.3309 (office) (b) (6) (cell) (b) (6) (home)
Gabe Sandholm gabe.sandholm@amecfw.com	Minneapolis, MN	612.252.3785 (office) (b) (6) (cell)
John Mazur john.mazur@amecfw.com	Wilmington, NC	910.444.2978 (office) (b) (6) (cell) (b) (6) (home)
Lori Dowling lori.dowling@amecfw.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@amecfw.com	Thorold, ON	905.687.6616 (office) (b) (6) (cell)
Tim Kihn tim.kihn@amecfw.com	Edmonton, AB	780.944.6363 (office) (cell)
Vladimir Ivensky (can call 24/7) vladimir.ivenksy@amecfw.com	Plymouth Meeting, PA	610.877.6144 (office) (b) (6) (cell) (b) (6) (home)
Kirby Lastinger kirby.lastinger@amecfw.com	Lakeland, FL	836-667-2345 x207 (office) (cell)

High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage should be reported within 60 minutes to one of the above HSE Representatives.

*Supervisor Responsible For:

- D&A Testing: Coordination as per client and AmecFW requirements, Local/Client Notifications, and Completing Initial IAR within 24 hours and forwarding to Corporate HSE.

Rev: Oct 2015



1 **FIELD TEAM REVIEW:** I acknowledge that I understand the requirements of this HSP, and agree to abide
2 by the procedures and limitations specified herein. I also acknowledge that I have been given an
3 opportunity to have my questions regarding the HSP and its requirements answered prior to performing
4 field activities. Health and safety training and medical surveillance requirements applicable to my
5 fieldactivities at this site are current and will not expire during on-site activities.

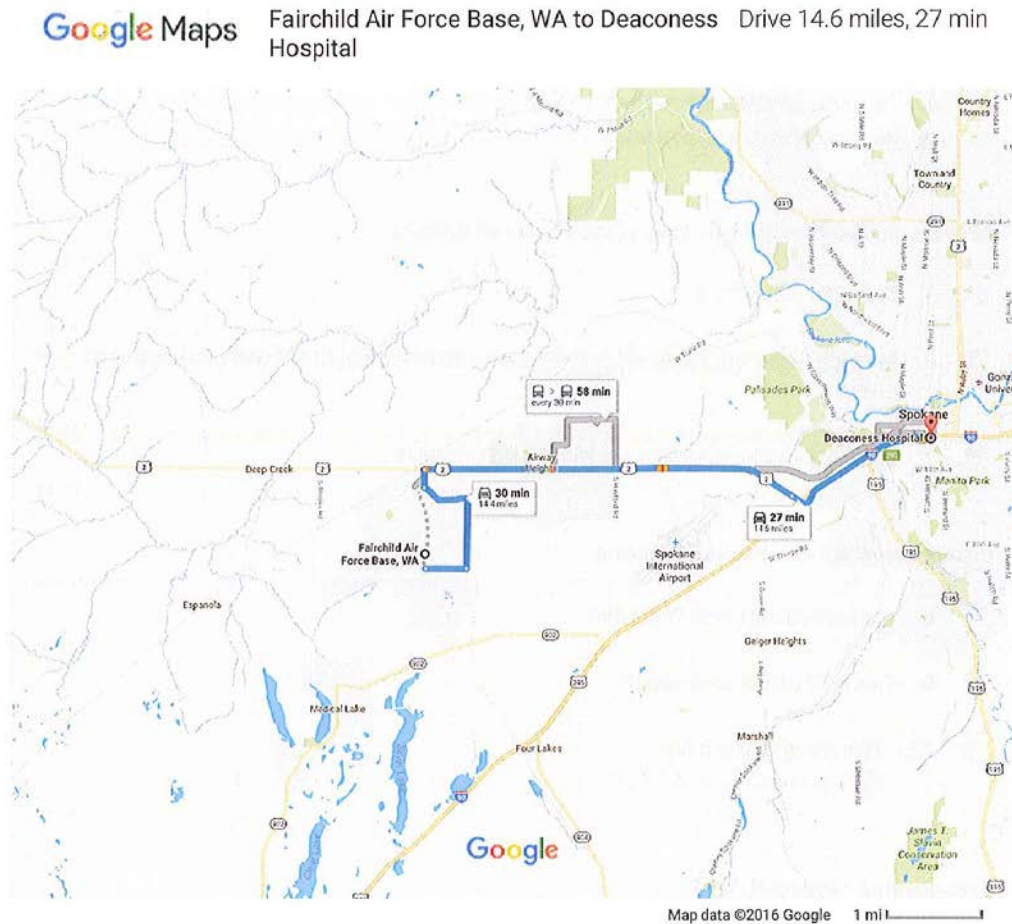
6

Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____

1 ROUTES TO EMERGENCY MEDICAL FACILITIES

2 HOSPITAL (for immediate emergency treatment):

3 Facility Name: Deaconess Hospital
4 Address: 800 West 5th Avenue
5 Spokane, WA 99204
6 Telephone Number: 509-458-5800
7



Fairchild Air Force Base, WA

Take S Rambo Rd and Eaker Rd to US-2 E

- ↑ 1. Head east on Thorpe Rd toward S Rambo Rd
⚠ Restricted usage road

11 min (3.6 mi)

- ↑ 2. Thorpe Rd turns slightly left and becomes S Rambo Rd
⚠ Restricted usage road

0.8 mi

1.4 mi

8
9 CONTINUED NEXT PAGE


 3. Turn left onto Eaker Rd
 Restricted usage road
1.0 mi

 4. Turn right onto Mitchell St
 Partial restricted usage road
0.4 mi

Continue on US-2 E to Spokane. Take exit 280 from I-90 E/US-2 E
14 min (10.4 mi)

 5. Turn right onto US-2 E
7.7 mi

 6. Keep left at the fork, follow signs for Interstate 90 E/Spokane/U.S. 2 and merge onto I-90 E/US-2 E
2.5 mi

 7. Use the right 2 lanes to take exit 280 toward Lincoln St
0.3 mi

Continue on W 4th Ave. Drive to W 5th Ave
2 min (0.6 mi)

 8. Continue straight onto W 4th Ave
0.2 mi

 9. Turn right onto S Jefferson Dr
351 ft

 10. Turn left onto W 5th Ave
 Destination will be on the left
0.3 mi

Deaconess Hospital

800 West 5th Avenue, Spokane, WA 99204

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.